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ABSTRACT

This study investigated the school adjustment of 1,300 low-income, minority children in the Chicago Public Schools. Chidren's progress from preschool to fourth grade was traced. Data were collected from teachers, parents, children, and computerized records. The study primarily examined mediated effects of preschool; influences on cognitive growth in reading; and predictors of writing development. Results indicated that children's reading achievement declined over time, and this decline coincided with the cessation of government-funded programs and the increasing prevalence of grade retention and school mobility. Positive long-term effects of preschool programs were retention and school mobility. These effects were more likely to occur if children entered school well-prepared and if their parents were involved in their schooling. Predictors of cognitive growth included grade retention, self-perception of school competence, and parent involvement. Writing development was weakly correlated with reading achievement. Implications for improving children's school success include: (1) early reinforcement of the effects of preschool; (2) responsiveness to the problems of at-risk children; (3) enhancement of family-school relations; and (4) increased provision of writing instruction. Extensive references follow each section of the report. (BC)

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MULTIPLE INFLUENCES ON EARLY SCHOOL ADJUSTMENT: RESULTS FROM THE LONGITUDINAL STUDY OF CHILDREN AT RISK

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Abstract

The purpose of this symposium is to present results from the Longitudinal Study of Children at Risk (LSCAR), an on-going investigation of the school adjustment of 1300 low-income, minority children in the Chicago Public schools. Tracing children's progress and development from preschool to grade 4, LSCAR may help offer insights into the school adjustment of children at risk. This continuing study is in part a response to the increasing prevalence of children at risk due to poverty of school failure and a desire to trace children's progress over time. Moreover, few longitudinal studies of at risk children have been conducted of the schooling process.

The analyses presented are based on 1255 children who spent the majority of their early schooling years, kindergarten to grade 4 (1986 to 1990) in the Chicago Public Schools. Data for this on-going study have been collected continuously in kindergarten through grade 4 from teachers, parents, and children as well as computerized records. Analyses were conducted to examine patterns of adjustment over time including cognitive achievement in reading, grade retention, school mobility, special education placement, and writing development. Major results, based primarily on three detailed studies of (1) mediated effects of preschool (2) the influences on cognitive growth in reading from school entry to grade 4, and (3) the predictors of writing development, indicate the following:

1. Children's cognitive achievement in reading declines over time, particularly in grades 1 and 4, and that this decline coincides with the cessation of government-funded programs and the increasing prevalence of grade retention, school mobility, and special education placement (See section 2).

2. Positive long-term effects government-funded preschool programs are more likely if children enter school well prepared, are initially perceived by their teachers to be well adjusted, are continuously promoted to the next grade, and if their parents are involved in their schooling, especially school activities (See Section 3). In other words, school success depends more on intervening school experiences than on interventions per se.

3. The strongest predictors of cognitive growth between school entry and grade 4 were, in order of magnitude, grade retention, self-perceptions of school competence in year 4, cognitive readiness at school entry, parent involvement in school in year 2, and age at school entry (in favor of younger children). The family-demographic variables sex, parent education, eligibility for free lunch, school socioeconomic status in kindergarten, and number of siblings did not contribute to cognitive growth, indicating their influence is mediated by intervening experiences. Preschool's influence was largely indirect through year 1 achievement and was exclusive to CPC preschool. Follow-up services had no significant influence on reading growth, at least over and above other entered variables.

4. Writing development is only weakly correlated ($r_s < .30$) with reading achievement. Some of its predictors are marital status of parents, motivation, self-perceptions of competence, attitudes toward school, parent involvement in school, and teacher ratings of children's adjustment. Opportunities to write would appear to affect liking of writing which would appear to affect writing ability.

Based on these results and others, seven implications are discussed for improving children's school success. All of them are based on the notion that such efforts must take account of the complex and multiple effects of schooling. Specifically, (1) the effects of preschool must be reinforced early in the schooling process, (2) school practices must be responsive to the problems of at-risk children, especially regarding retention and school mobility, (3) efforts to enhance family-school relations must be vigorously encouraged, and (4) more writing instruction and opportunities must be provided early in schooling by teachers more versed in teaching this subject. Again, all of these efforts must not occur in isolation but reinforce and build upon each other.

Section 1

Introduction

Arthur J. Reynolds

Overview

This symposium summary describes the results from the Longitudinal Study of Children at Risk (LSCAR), an on-going investigation tracing the early school adjustment of 1300 low-income, ethnic minority children who are at risk due to poverty of low academic achievement and dropping out of school. Its goal is to identify, describe, and begin to understand some of the factors that influence early school adjustment and achievement, particularly those that are alterable in an educational context. In the following pages the background, implementation, results, and implications of the study are described. Section 1 provides an introduction to the research context of children at risk after noting the prevalence, growth, and definition of children at risk. Section 2 summarizes the implementation of the study, including its goals, sample selection, data collection, and primary measures. Section 3 includes a description of major patterns of adjustment from kindergarten to grade 4, including cognitive development in reading, grade retention, mobility, and special education placement. In Sections 4, 5, and 6, three in-depth analyses that address three major research questions are presented: (1) mediated effects of preschool experience, (2) individual, family, and school influences on cognitive growth in reading, and (3) factors influencing writing development. In the concluding Section 7, a number of implications are discussed regarding improving the school success of children at risk as well as future directions for the study.

Background

The increasing prevalence of children at risk of school failure continues to concern educators, researchers, and policy makers alike. Because children represent our human potential, the growing presence of children at risk due to poverty and minority status may severely limit the future success of millions of children since they are more likely to drop out of school and experience problems of adjustment (Coll, 1990; Steinberg, Blinde, & Chan, 1984; Tuma, 1989). Also, the increasing prevalence of such children reduces the efficiency of schools since increased expenditures for educational programs would almost surely be needed on their behalf. Moreover, the greater prevalence of at-risk children has social and economic costs since more frequent school failure is associated with unemployment, delinquency, crime, and welfare dependency.

Defining Risk

Although often used and rarely defined, the term "at risk" has come to signify children with special needs who, for a variety of reasons, have been underserved in schools and in society, and are less likely than others to reach their full potential. Generally speaking, "at risk" refers to "a wide range of biological and environmental conditions that are associated with increased probability for cognitive, social, affective, and physical problems" (Kopp, 1983). In this study, children are at risk due to environmental or sociocultural factors (e.g., poverty, economic hardship) as opposed to biological factors. Sociocultural risk is the most prevalent source of risk affecting 30 to 40% of children under 18 (Natriello, McDill, & Pallas, 1990). Garbarino (1982) defined sociocultural risk as the "impoverishing of the child's world so that the child lacks the basic social and psychological necessities of life" (p. 32). Sociocultural risk factors may include poverty, race/ethnicity, poorly educated mothers, single-parent families, and limited English proficiency families (Natriello et al., 1990). These factors are not only correlated with lower academic achievement and dropout behavior but associated adjustment and mental health problems as well (Tuma, 1989).

The primary sociocultural risk factor in this study is poverty since the children grew up in poverty neighborhoods (i.e., 40% low-income; Mincy, Sawhill, & Wolf, 1990) and were eligible for government-funded services (Slavin & Madden, 1989) as well as exhibiting other risk factors such as belonging to ethnic minority groups and living with single parents who have not graduated from high school. No matter what the criterion, sociocultural risk usually reflects a lack of adequate resources, education, and support systems to prepare children for academic success. It is notable that sociocultural risk preceded

children's entry in school, thus it is not an intervening or mediating factor in adjustment. Moreover, risk is not intended to imply inevitability. Indeed, by definition risk means uncertainty and that substantial variation among children will exist in educational outcomes.

Prevalence

The number of children at risk is higher today than ever before, owing partly to the 75% increase from 1970 to 1980 in the number of poor neighborhoods (Mincy, Sawhill, & Wolf, 1990) as well as the continuing growth of poverty among all racial and ethnic families and children, especially Hispanics (Orfield, 1988). Moreover, the number of children with any sociocultural risk factor has increased since 1984 according to the U. S. Census. Natriello, et al. (1990) indicated that approximately 40% of children under 18 are currently at risk, a figure consistent with performance measures reported by the National Assessment of Educational Progress (NAEP, 1985). Due to the high concentration of at-risk children in metropolitan areas, such trends probably underestimate the severity of the problem in cities like Chicago and Los Angeles.

Unfortunately, projections by the U. S. Census Bureau suggest more growth in the population of children at risk in the next century. Natriello et al. (1990) noted some of these projections for 2020 from 1987 levels:

- 33% increase (or 4 million) in the number of children living in poverty, leaving 26% (or 16.5 million) of all children in poverty.

- 18% increase (or 3 million) in the number of children not living with both of their parents. This will bring the total to 20 million.

- 41% increase (or 5 million) in the number of children living with mothers who have not completed high school, bringing the total to 18 million.

- The number of children with a primary language other than English will double to over 5 million.

Research Trends

In view of this disturbing state of affairs, it is not surprising that researchers have begun to focus more closely on at-risk children documenting both their problems and the factors that influence their adjustment. The number of scholarly publications devoted to at-risk children in the late 1980s reflects this growing concern (Horowitz & O'Brien, 1989; Natriello, et al. 1990; Slavin, Karweit, & Madden, 1989; Spencer & McLoyd, 1990; Slaughter & Epps, 1987). Despite the more focused attention to the problems of at-risk populations, many of the most important questions are just beginning to be answered; many are just beginning to be asked. Research aimed at preventing the negative effects associated with at-risk status may offer the greatest benefit to children and families. Two areas that have clear implication in this regard are the effects of intervention programs on children's development and the identification of alterable factors that influence children's adjustment.

Evaluating the effects of intervention programs (i.e., Head Start) has been one of the most prevalent research endeavors with at-risk populations (Haskins, 1989; White, 1985-1986). The results of such programs have indicated that intervention programs have significant short-term effects on children's cognitive ability, but these effects fade considerably after 2 or 3 years. White (1985-86), for example, meta-analyzed over 300 intervention programs, mostly for disadvantaged children, and found an effect size of one-half a standard deviation for the immediate end-of-program, although over time, the effects faded substantially. More recently, Haskins (1989) summarized the results of experimental preschool programs and Head Start and concluded that these programs produced significant short-term gains in scholastic achievement but that "gains on standardized IQ and achievement tests as well as on tests of socioemotional development decline within a few years" (p. 278). Due to these results, some investigators (Haskins, 1989; Wachs & Gruen, 1982) have called for major research efforts on the nature of fading effects of interventions. Efforts in this regard may offer insight about the factors that are responsible for carrying forward and maintaining effects once interventions have ceased.

Regarding the factors that influence children's development as indexed by achievement test scores, a wealth of research has been done, but not a great deal with at-risk populations. Available research indicates that cognitive readiness upon school entry has substantial, lasting effects on cognitive performance (Butler, Marsh, Sheppard, & Sheppard, 1985; Carter, 1984); parent education (high school graduation) positively influences children's success in school (Entwisle & Alexander, 1990; Steinberg et al.

1984); retaining children in grade has negative effects on children's achievement and adjustment (Jackson, 1975; Shepard & Smith, 1989); school adjustment and psychological well-being are related (Kellam et al., 1975); and home environmental conditions influence children's development including early stimulation and parent responsiveness (Bradley et al., 1989).

Also, it has been found that parents of children at risk have high expectations for their children but often don't have the resources or experiences to help meet their expectations (Alexander & Entwisle, 1988; Lazar & Darlington, 1982). There is diversity in the population of children at risk, more than would be expected given their similar experiences. Kellam et al., (1975), for example, found home ownership within at-risk communities to be greater than expected. It is these kinds of differences which may lead many children to overcome their disadvantages, and go on to lead successful lives (Brambring, Losel, & Skowronek, 1989; Dugan & Coles, 1988). This implies, of course, that "at-riskness" should be conceptualized as a continuum of experiences rather than an absolute standard.

Yet given the magnitude of the problems of children at risk, research has simply not gone far enough in understanding their lives. More systematic efforts on a wide range of topics need to be made on their behalf. This can even be said for studies of intervention, a topic that has had a great deal of attention. About Head Start, Haskins (1989) noted that "it is surprising that after 20 years, we still do not have good long-term studies of Head Start. The American public spends more that $1 billion per year on Head Start, and yet we have little credible evidence of the positive outcomes...that we know are possible" (p. 280).

What appears to be needed to guide research are conceptual models and empirically validated models of the adjustment process of children at risk. These models must take into account the multiple influences of the family, educational and social context, and individual behavior. However, beyond purely exploratory models, specification of these models implies that the relevant factors can be identified and validly measured. Before embarking completely on this topic, some of the individual factors need to be clarified. Often, a tendency among investigators is to assume that models and factors used to understand children not at risk also apply to children at risk. This assumption may not be warranted. Different factors and processes may be at work that necessitate separate analyses.

Many of the most important questions are just beginning to be recognized. Based on a selected review of the literature, the following questions appear relevant to research with children at risk:

1. What patterns in children's academic progress emerge over time, including their achievement, maturity, and adjustment difficulties (i.e., retention, assignment to special education)?

2. What are the differential effects of publicly funded preschool programs over time, including Head Start, and various other state and locally funded programs? Unfortunately, most of the empirical support of these programs comes from evaluations of privately funded experimental programs. Only methodologically rigorous evaluations of Head Start and other programs can eliminate the overgeneralization of results that have predominated in recent years.

3. To what degree do differences in home environment account for differences in cognitive performance? What kind and degree of parent involvement is needed to foster academic development in children? What role can schools play in this process?

4. What school-based factors influence children's development? Which particular instructional programs, teacher behaviors, and school practices will maximize the development of children at risk?

5. What factors play a role in the continuity and discontinuity of children's development from kindergarten through the primary grades? What is the relationship among these factors and their possible interactions? Which factors or processes are responsible for the fading effects of interventions such as Head Start?

Research addressing these questions and others would benefit from <u>longitudinal studies</u> which are important for tracing patterns of development and transitions in at-risk populations over time. Studies occurring early in children's lives are particularly important for at-risk children to examine the onset of learning difficulties and their possible prevention. For example, early academic motivation may be an important source of stability in the adjustment process. Also, a focus on <u>multiple influences</u> on

educational outcomes would also contribute to our understanding of early school adjustment. Data collected on a wide range of home, parental, school, and social context factors as well as multiple child outcomes may provide a more comprehensive context of schooling and development. Finally, because of the inherent complexity of human development, analytic techniques that are consistent with this complexity deserve more attention. Multivariate analyses such as structural modeling (e.g., LISREL), for example, that have the ability to handle common problems of nonexperimental data such as measurement error and construct validity can make an important contribution.

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Section 2

Design of the Longitudinal Study

Mavis Hagemann and Arthur J. Reynolds

With this research context in mind, the Longitudinal Study of Children at Risk (LSCAR) began in 1986 and has evolved into a comprehensive investigation of the school adjustment of children at risk. The study is guided by three major objectives.

1. To trace patterns of academic progress and adjustment over time including achievement and school competency. Do patterns of adjustment differ by groups within the sample?

2. To determine the effects of family, school, and child-based factors, especially those that can be used to improve children's school adjustment and help prevent future school difficulties.

3. To better understand the mechanisms by which factors transmit their effects throughout the early schooling process.

Sample Selection

Fifteen hundred and forty (1540) children who enrolled in government-funded kindergarten programs in the Chicago Public Schools in 1985-1986 constituted the sample. Included are all children in Chapters 1 and 2 Child-Parent Centers (CPC) that have kindergarten, all children in Chapter 2 all-day kindergarten programs, and a random sample of 6 schools in the Chicago Effective Schools Project (CESP), a local kindergarten program. By definition, the sample is representative of children in government funded early childhood programs, thus fairly well represents children at risk due to poverty in Chicago and probably other large metropolitan school districts.

Table 1 provides a description of sample characteristics of 1255 (80% of the original sample) children who remained in the school system in year 4 (the 1989-1990 school year) and who spent at least three years including kindergarten in the Chicago Public Schools. The sample retention rate of 80% is extraordinary given that the typical rate over three waves is about 50% (Kessler & Greenberg, 1981). The original sample sizes for each year of the study were as follows: kindergarten, N = 1540; year 1, N = 1389; year 2, N = 1334; year 3 = 1334; year 4, N = 1274.

The analyses reported in this study are based on the sample of 1255 children, which is similar to the original sample on nearly all characteristics. To obtain the final sample, missing data on test scores were imputed for some cases.[1] The data reported in Table 1 were collected from school records and parent surveys mailed in spring of year 2 (1988) and year 4 (1990).

Insert Table 1 about here

As shown, the children were at multiple risk of school difficulties. All children were ethnic minority and attended kindergarten schools in poverty neighborhoods. Over 90% of the surveyed parents reported their child was eligible for a partial or full lunch subsidy. A substantial number of parents (41%) reported that they did not graduate from high school, although, because of missing data and unreliability of parent reports, this may be a conservative estimate. However, there were few observed differences in outcomes between children whose parents were missing and not missing on parent education. Also, note that a substantial number of children (70%) attended government-funded preschool in Chicago.

Program Groups

As indicated above, children were selected from one of four government-funded preschool/kindergarten programs, which are specifically designed to serve children who come from poverty and minority backgrounds. The goal of these language-enhanced and basic-skills programs is to improve children's cognitive and affective readiness for the primary grades. Each program provides teachers with teacher aides, support services, and inservice meetings provided by the Bureau of Early Childhood Programs of the Chicago Public Schools. Although entry into the CPCs required residency in an area eligible for ECIA Chapter 1 services and applicants were accepted on a most-in-need basis, the groups were similarly at risk for school problems.

Chapter 1 CPC. All Child-Parent Centers in this study serve three and four-year-olds and include preschool, kindergarten, and primary-grade components. Half-day kindergarten is provided for those who had at least one year of CPC preschool. In addition to classroom staff, each CPC has a head teacher and a parent resource teacher. As long as their child is in the CPC, parent participation is required. Every CPC is part of a larger school unit, but almost all Chapter 1 CPCs are situated in buildings separate from the main school. Program services are also available in grades 1 and 2 for students who remain in their kindergarten school. They include a teacher coordinator, slightly lower class size, a teacher aide for each classroom, and funds for additional supplies.

Chapter 2 CPC. This program is similar to the Chapter 1 CPC with three exceptions. Five of the six Chapter 2 centers are in wings of the school, not separate buildings. Also, the program receives extra funds from Chapter 2, which provide for all-day kindergarten, a teacher aide, additional supplies and equipment, and separate inservice sessions for teachers and aides. Finally, follow-up services are extended to grade 3 rather than grade 2.

Chapter 2 Home School (H-S). These children enter kindergarten in the same public school as the Chapter 2 CPC children, but they have no known history of preschool. Chapter 2 provides the same all-day kindergarten program, additional funds for a teacher aide, supplies and equipment, and inservice sessions as for the CPC. In all but one school, the classrooms for these children are near the CPC kindergarten classrooms and the teachers all work together under the CPC head teacher. Parents are welcome to participate in the CPC, but it is not a requirement. However, children do receive the same follow-up services in grades 1 to 3 as the Chapter 2 CPC children.

CESP. Unlike the other programs, only one quarter of the children in the Chicago Effective Schools Project have had preschool (Head Start). The program offers all day kindergarten, a teacher aide for each class, and extra funds for inservice and materials. No systematic follow-up services are provided in the kindergarten schools.

Instruments and Data Collection

Table 2 summarizes the instruments used in the study for the first five years (kindergarten to year 4). For description, response frequencies of each instrument are provided for the original 1986 sample, the analyzed sample prior to test-score imputations, and the analyzed sample after imputation of test scores.

Insert Table 2 about here

As implied in Table 2, a wide range of social-psychological data have been collected from children, parents, and teachers from 1986 (kindergarten) to 1990 (year 4). A partial list of these variables includes prekindergarten experience, cognitive readiness, parent involvement, family background and environment, school mobility, retention, school attitudes, motivation, yearly cognitive achievement, and teachers' assessment of child progress every spring. More specific information is described below (for a complete description of the measures see Reynolds, Bezruczko, Hagemann, and Mavrogenes, 1991).

Standardized test scores. To assess both cognitive readiness and basic skills, children completed group-administered cognitive achievement tests (Iowa Tests of Basic Skills) each spring as part of the public school's citywide testing program. The cognitive readiness tests were administered upon entry in kindergarten in the fall of 1985 and again in the spring of 1986. The fall 1985 test was used as a baseline measure of cognitive achievement. Beginning in first-grade (spring 1987), reading and mathematics total subtest scores were retained for analysis. In the analyses reported below, the reading grade-equivalent scores were converted to equal-interval scores using item response theory methods.[2]

Teachers. Teachers were surveyed every spring and rated children's school adjustment, motivation, and behavioral problems, and letter grades. Parent involvement at home and in school was also assessed as were the frequency of reading and writing activities. All items were rated from poor/not at all (1) to excellent/much (5) and were designed to be consistent across years. Sample items include: "Came to my class ready to learn" (year 1), "Is motivated to learn", (year 2), and "Works well without supervision" (year 4).

Parents. Questionnaire data from parents was designed to gather information about children's home environment, frequency of school-related activities, and attitudes of parents and their children toward school success. Data were gathered in years 2 and 4. Overall, 737 different parents (mostly mothers) responded and provided information on their education and income (eligibility for lunch subsidy). Other information obtained included the frequency with which they read, cook, discuss school progress with child as well as participate in school activities.

Children. In years 3 and 4 (spring 1989 and 1990), children responded, using a three-point scale from not much (1) to a lot (3), to items about their attitudes toward school, their experiences in school, and family involvement in their education. Children were also provided with space to write in comments about their reactions to school. Some year 3 items included: "I get bored in school", "I like to read", "I like my teacher", "I do my homework", and "School is important."

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NOTES

1. To be included in the final sample, the following three conditions had to be satisfied: (a) children must have a valid identification number, (b) they must have been active in the Chicago Public Schools in kindergarten, years 3 and 4, and (c) could not have more than five missing test scores from kindergarten to year 4 (11 reading and mathematics scores were possible). Test scores of children satisfying these three conditions were imputed in the following manner. Those missing one score (reading or mathematics) within a particular year were given the value of their valid score that year. Children missing both reading and mathematics scores for a particular year were assigned subgroup means based on their kindergarten program group and if they were retained during that year. For the entering school cognitive readiness and kindergarten achievement, imputations were based on children's kindergarten program group and their parents' educational background (high school graduate or nongraduate). The imputations did alter the variances of scores, with the exception of entering school cognitive, which had a variance reduction from .24 to .18 (about 350 cases were imputed).

2. Test score conversions are based on 1977-1978 norms. In the spring of 1990 the Chicago public school system began using 1988 norms in computing scores.

Table 1

Sample characteristics for the Longitudinal Study of Children at Risk (N = 1255)

Characteristic	Percent	Sample size
Race/ethnicity	95% Black	1191
	5% Hispanic	60
Sex	51% girls	640
	49% boys	615
Age at kindergarten entry	74% More than 60 months	906
	26% Up to 60 months	325
School SES in kindergarten	100% poverty-designated neighborhoods (range = 45-86% low-income)	1255
Parent education	59% high school graduate	430
	41% less than high school	307
Eligibility for federal lunch subsidy	85% full subsidy	629
	8% partial subsidy	61
	6% no subsidy	47
Missing parent education/lunch subsidy	41% not known	518
	59% known	737
Number of siblings	18% none	188
	54% 1-3	573
	28% 4-6	296
Preschool experience	70% CPC or Head Start	873
	30% none	382
Program participation	44% Ch 1 CPC	551
	21% Ch 2 CPC	257
	10% Ch 2 Home School	130
	25% CESP	317

Note. Ns may not add up to 1255 due to missing data.

Table 2
Data Collection, Sample Attrition, and Response Rates in the Longitudinal Study of Children at Risk

Source	Sample	Kindergarten Fall 1985	Kindergarten Spring 1986	Year 1 Spring 1987	Year 2 Spring 1988	Year 3 Spring 1989	Year 4 Spring 1990
Number of children available		1540	1540	1389	1334	1334	1274
Test scores	Original	1102	1531	1358	1322	1291	1240
	Final before imput.	913	1255	1192	1211	1241	1228
	Final after imput.	1255	1255	1255	1255	1255	1255
Teacher Survey	Original	-	935	1263	969	1148	900
	Final before imput.	-	753	1070	850	1077	814
	Final after imput.	-	753	1070	850	1077	814
Parent survey	Original	-	-	-	533	-	496
	Final before imput.	-	-	-	501	-	487
	Final after imput.						
Student survey	Original	-	-	-	-	1133	900
	Final before imput.	-	-	-	-	1040	799
	Final after imput.	-	-	-	-	1040	799

Section 3

Patterns of Adjustment: School Entry to Year 4

Mavis Hagemann and Arthur J. Reynolds

To begin to understand children's school adjustment it is important to examine some of the trends that have occured over time. Cognitive achievement in reading is a particularly important indicator of early school success and is the foundation on which basic skills are mastered. In this section, performance in reading is highlighted as well as the intervening experiences of grade retention, school mobility, and special education placement.

Reading Achievement

Figure 1 shows grade-level performance in reading of the panel of 1255 children from the end of kindergarten to year 4 (grade 4 for most children). Although 65% of the sample was performing at or above the national mean in kindergarten, over time fewer and fewer children maintained their performance relative to their peers. The greatest drops in relative performance occured from kindergarten to year 1 (65% to 50%, a 15% drop) and from year 3 to year 4 (38% to 24% of sample at grade-level or above). Both these periods are significant in children's lives. In the former case, the transition from kindergarten to primary school is the time children establish the skills to read as well as adjust to the demands of full-time schooling. In the latter case, children are making the transition from primary to elementary school and begin to be exposed to more complicated textual materials. In both cases, children are falling behind their age-level cohorts, but not necessarily their Chicago cohorts. Also, it is notable that, on average, the farther children proceed in school, thus the farther they get away from government-funded intervention programs, the lower their performance. This pattern is consistent with the fading effects of early intervention programs (White, 1985-1986; Haskins, 1989).

Moreover, as shown in Figure 2, declining achievement is also consistent across the four program groups, although the Chapter 2 CPC group, which had preschool and all-day kindergarten, consistently fared better than their peers. For example, over half the Chapter 2 CPC group was at grade-level in year 3 and performed higher in year 4 despite substantial drops in grade level performance. Note that the group with the least intervention, children in the Chicago Effective Schools Program, performed at the lowest levels.

Insert Figure 1 and 2 about here

Although the reasons for this decline in grade-level performance are open to question, previous analyses with this sample have found that grade retention and special education placement (Reynolds, 1990) and school mobility (Reynolds, 1989a, 1989b, 1990) are disruptive intervening influences on children's cognitive achievement. These findings corroborate and extend on other studies (Berrueta-Clement et al., 1984; Kellam et al., 1975; Shepard & Smith, 1989).

Insert Figure 3 and 4 about here

Grade Retention

Figure 3 shows cumulative grade retention patterns from kindergarten to the end of year 4 as a percent of the total sample. Quite evident, as the school process continues children are consistently retained-in-

grade more frequently. By the end of year 4, 23% of the sample had been retained at least once (27% if only students active in year 4 are counted) and it appears likely this upward pattern will continue in later grades. Chapter 1 (18%) and Chapter 2 CPC (12%) groups, however, were less likely to be retained than their peers. Most children were retained in grade 1, which is not surprising since, as discussed above, at-risk children experience difficulties associated with learning to read. A common response of schools is to flunk them.

Figure 4 shows grade-equivalent reading achievement of continuously promoted and ever-retained children in year 4. Retained children are far behind both their age-level peers (mean = 2.3 vs. 3.8 grade-equivalencies) as well the expected achievement of their grade-level peers (mean = 2.3 vs. 3.8), indicating that while students are retained to enable them to achieve satisfactorily, retention actually has negative effects on achievement. This observed finding is consistent with many previous studies (Holmes, 1989).

Insert Figures 5 about here

School Mobility

Similar upward trends occurred for both school mobility and special education placement. As shown in Figure 5, 57% of the sample changed schools at least once from kindergarten to year 4, which suggests pervasive environmental disruptions in children's environments that may hinder learning. Although mobility may signify underlying family instability, economic hardship, and poverty, our previous studies indicate that mobility has an independent and negative influence on achievement in years 1 to 3, net of family background and child attributes (Reynolds, 1989a, 1989b). Consequently, changing schools appears to have consequences in its own right. For example, in year 4 mobile students performed significantly lower (3 months) than non-mobile students, and this result was consistent across program groups. One major question to be addressed is the extent to which this difference is the result of environmental disruption as opposed to family background factors that are associated with mobility.

Insert Figure 6 about here

Special Education Placement

Special education placement (e.g., learning disabled, mildly handicapped), though it becomes more frequent over time, is not as prevalent as grade retention and school mobility, at least during this time period. Indeed, as shown in Figure 6, only 11% of the sample was assigned to special education from years 1 to 5. However, the observed trend indicates continued growth in the number of referrals over time.

The above patterns suggest that children's reading achievement declines substantially over time and may be at least partially explained by intervening factors that occur after preschool and government interventions have ended. These factors may be important in contributing to discontinuities in schooling. For example, it could be argued that regardless of the effects of early intervention programs such as CPCs, Head Start, and other programs for low-income children, potentially negative intervening experiences such as grade retention and school mobility neutralize these effects or make school success less likely. In the following sections, these and other factors are considered in detailed analyses to better determine their contribution to school achievement and adjustment.

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Figure 1

Reading Achievement
By Year

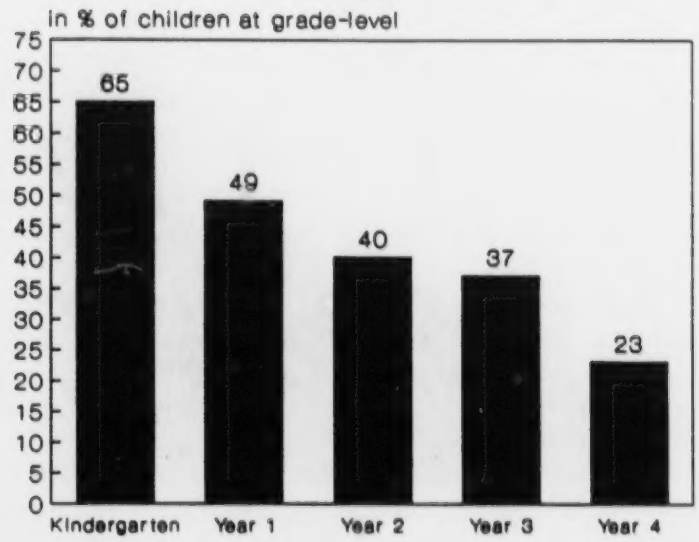


Figure 2

Reading Achievement
By Year

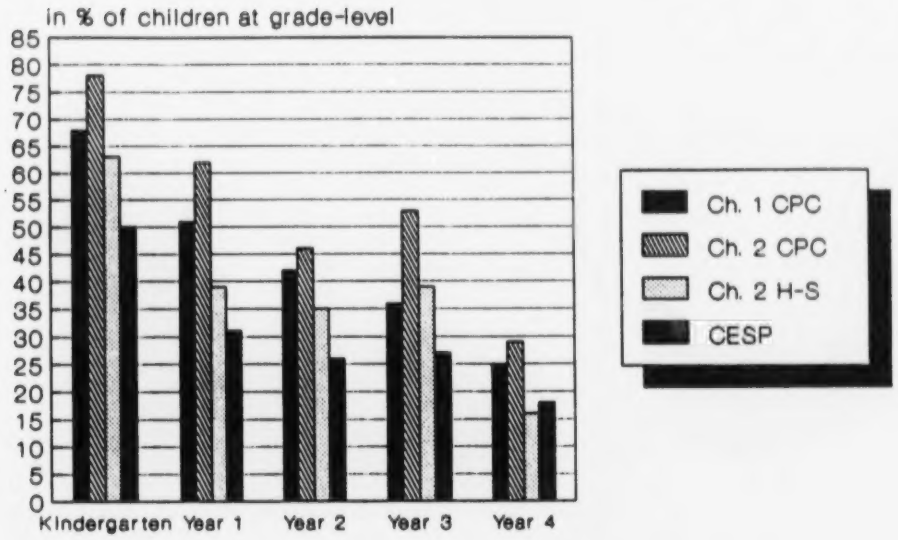


Figure 3

Retention Patterns

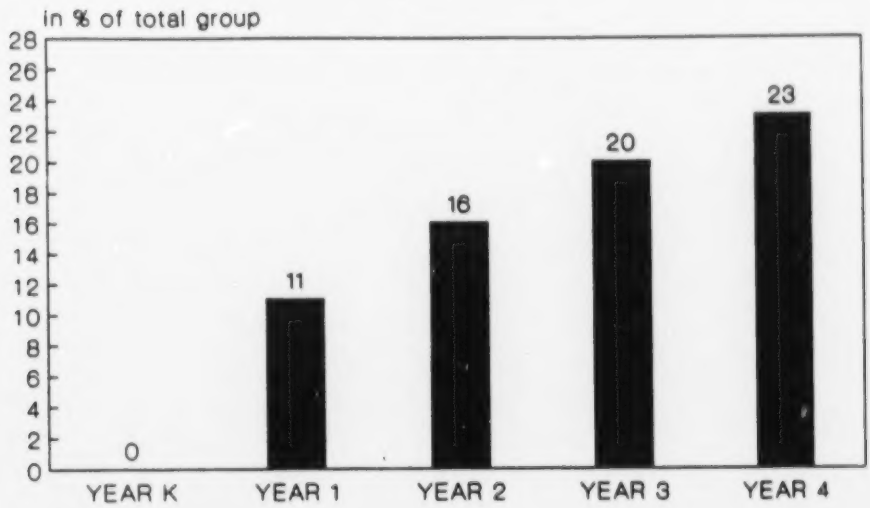


Figure 4

Year 4 Achievement
By Retention

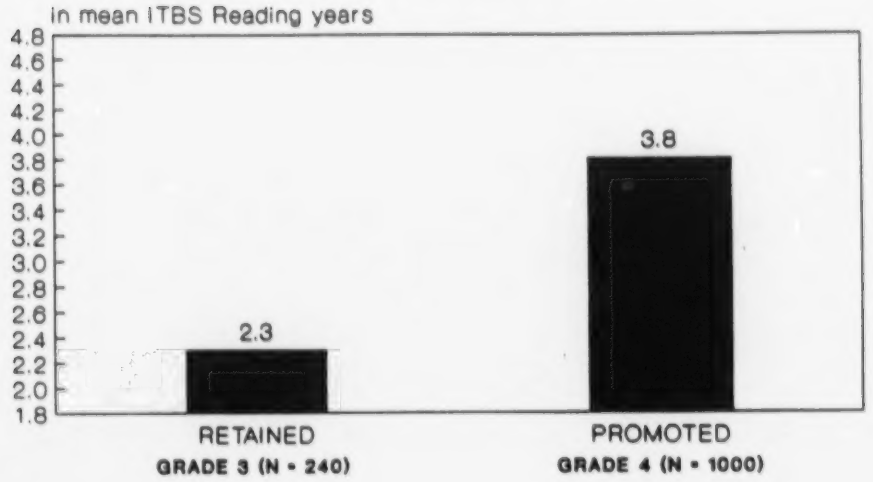


Figure 5

Mobility Patterns

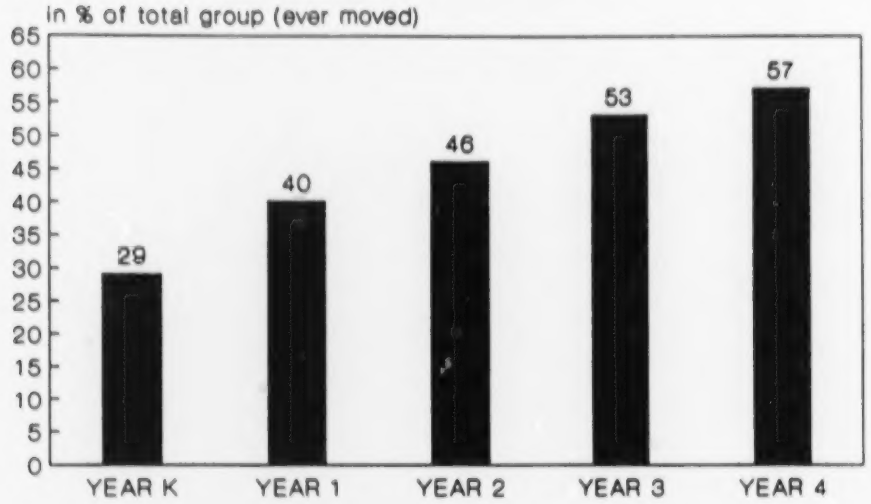
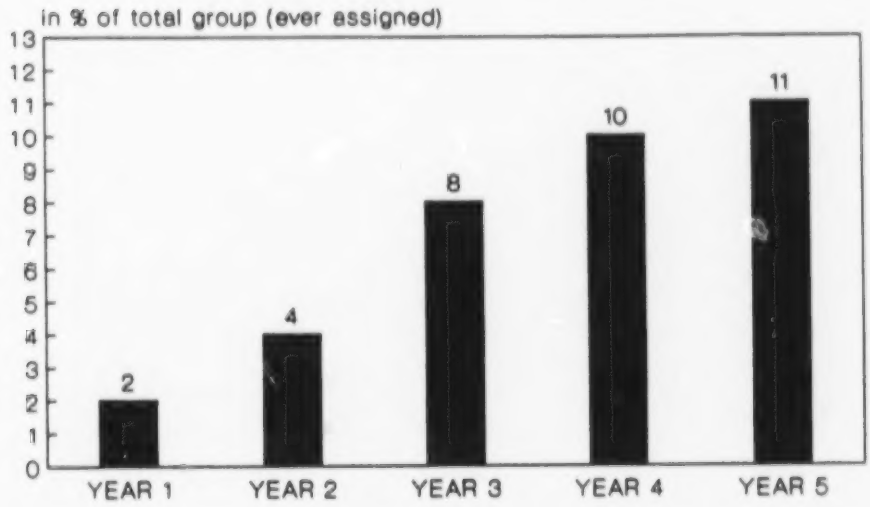


Figure 6

Special Ed Patterns



Section 4

Study 1: Mediated Effects of Preschool

Arthur J. Reynolds

Evaluations of preschool intervention programs for economically disadvantaged children have consistently found that effects on scholastic achievement fade over time. These findings come from a massive research effort of public and private programs over the past two decades that has included 1,500 studies of Head Start (Hubbell, 1983), 400 studies of early interventions (White, 1985-1986), the well known Consortium of Longitudinal Studies (Lazar, Darlington, Murray, & Snipper, 1982), and in particular, the Perry Preschool program (Berrueta-Clement, Schweinhart, Barnett, Epstein, & Weikert, 1984; Schweinhart & Weikert, 1980). Haskins (1989), in his comprehensive review of preschool programs, noted that while preschool yielded significant short-term gains in scholastic achievement, "gains on standardized IQ and achievement tests as well as on tests of socioemotional development decline within a few years" (p. 278). Although both White (1985-1986) and Haskins noted that many studies had methodological limitations, particularly those of Head Start, fade out effects on academic achievement do not appear to be an artifact of methodology because they occur for all types of studies, experimental or otherwise. Nor are fading effects specific to programs for disadvantaged and at-risk children. They have been documented with middle class samples and for nearly all programs involving single or isolated experiences (Wachs & Gruen, 1982).

These results, of course, do not mean that preschool programs are ineffective as their effects on school readiness measures are consistent and substantial, by as much as one-half a standard deviation (White, 1985-1986). Moreover, long-term effects on measures of school competence (e.g., grade retention and special education placement), rates of high school graduation, and employment status are beginning to accumulate, at least for private experimental programs (Haskins, 1989). Yet, that these results are not due to lasting changes in intellectual performance suggests that a complex network of effects may be at work whereby the effects of preschool are dependent on intervening factors experienced after the intervention has ended. Investigators have increasingly noted this inter-relatedness between preschool and intervening influences. Wachs and Gruen (1982), for example, in their extensive review of early development, noted the importance of identifying factors that "maximize or minimize the long-term impact of early intervention...Unfortunately, what must happen to maintain these early gains is not yet clearly understood" (p. 249). Woodhead (1988) argued for the study of other variables in the "search for processes that might account for transmission of long-term effects" (p. 447), including school and home environments. Haskins (1989) called for "research on the transition to public schools and other studies designed to account for the fading of intellectual gains achieved in preschool." (p. 280). Two implications of these trends are that (1) preschool's later effects are largely indirect and are transmitted by intervening factors and (2) research must direct itself toward examining mediators of effects.

Although studies have not examined comprehensively the process by which preschool exerts its influence on children and explains fading effects on achievement, research has identified potentially important mediators of preschool. These include cognitive school readiness, the school context children enter subsequent to preschool, and the family context children experience during early schooling and beyond. Berrueta-Clement et al. (1984), in their study of children in the Perry Preschool Program through age 19, found that cognitive school readiness was the critical mediator or transmitter of effects to school outcomes including teacher ratings of social maturity, academic achievement, assignment to special education, and high school graduation as well as post-high school employment and delinquency. The indirect effects of preschool, however, were largest for earlier school outcomes and were only remotely

related to high school and post-high school measures. The strong relation between preschool and school readiness has been a consistent finding of preschool studies generally (Haskins, 1989; White, 1985-1986). These results indicate that cognitive readiness on school entry is a powerful early mediator of preschool, and may act as a gatekeeper of academic progress that partially determines the transition to schooling (Woodhead, 1988).

Aspects of the school context have also been found to be significant mediators of preschool, including grade retention, assignment to special education, and teacher ratings of maturity. Lazar et al. (1982), in their study of 11 experimental preschool projects in the Consortium of Longitudinal Studies, found that preschool children were less likely than controls to be placed in special education and retained in grade, probably because they were perceived by their teachers as having positive attitudes toward school and a greater readiness to learn, both of which promoted subsequent adjustment and achievement. These effects on retention and special education placement have been supported by studies of private programs (Berrueta-Clement et al., 1984; Sprigle & Schaefer, 1985), but have not been conclusively shown for government-funded programs such as Head Start (Haskins, 1989), possibly because the effect of preschool may be exerted through cognitive readiness. Retention and assignment to special education are life events since they have powerful psychological consequences that may disrupt adjustment (Johnson, 1986). If avoided, they may help extend positive achievement patterns that make school success more likely. On the other hand, if they are not avoided, the benefits of preschool may be neutralized as children may expect less of themselves and teachers less of them.

A third set of variables that may mediate the effects of preschool on later outcomes is family socialization and involvement in children's schooling after the cessation of preschool. Reynolds (1989a, 1989b), testing a social context model of early school adjustment for low-income, minority children which included preschool (Head Start and a similarly designed Child-Parent Center Program), found that parent involvement in grade 1 as assessed by teachers mediated the effect of preschool on grade 1 outcomes including cognitive achievement and socioemotional maturity, controlling for children's prior achievement, motivation, sex, and school characteristics. Children who attended preschool and whose parents were involved in school were more likely to benefit from preschool. A second-year follow-up found continuing effects of preschool through parent involvement (Reynolds, 1989b). It was also found that school mobility (the number of school moves between kindergarten and second-year) negatively influenced achievement outcomes, indicating that the environmental disruption of moving, a likely consequence of family poverty, may also contribute to the continuing effects of preschool or school adjustment generally. The finding of negative effects of school mobility is consistent with other studies (Kellam et al. 1975; Levine, Wesolowski, & Corbett, 1966). These results implicate family involvement and associated factors in extending the effect of preschool suggested by investigators (Bronfenbrenner, 1975; Wachs & Gruen, 1982; Woodhead, 1988; Zigler & Valentine, 1979). Wachs and Gruen (1982), for example, speculated that preschool effects would be maintained only to the degree that parents have time and social support to continue intervention, that parents have the motivation and skills, and that the home environment supports development.

The above studies suggest at least some of the mediators that transmit the effects of preschool to school outcomes. An implication is that preschool cannot be divorced from the context in which it occurs; it is dependent on intervening school and family factors. These findings support a social context view in understanding the effects of preschool, whereby the environments children experience subsequent to preschool are critical in maintaining effects (Bronfenbrenner, 1979; Sameroff, 1975). However, as much as these studies suggest the indirect effects of preschool through school and family factors, they were not designed to explain differences in early school outcomes, particularly fading effects on achievement. Also, since the most conclusive findings are from private, experimental programs, the generalizability of results to government-funded programs is unclear (Haskins, 1989).

The present study tests the above social and environmental factors as mediators of preschool on year 3 achievement, a time when observed achievement effects have largely faded (Haskins, 1989; White, 1985-

1986). The major question addressed is: What are the primary pathways through which preschool exerts its effects on achievement? The process will be tested by structural modeling techniques, which are designed to test models with intervening factors. Specifically, it was hypothesized that (1) preschool will be mediated by (and directly associated with) cognitive readiness, teacher ratings of socioemotional maturity, parental involvement, retention, and special education placement, (2) preschool will be indirectly related to school mobility through cognitive readiness, and (3) as mediators of preschool, cognitive readiness, teacher ratings of progress, parent involvement, retention, assignment to special education, and school mobility will be directly associated with achievement.

This study traces the impact of a government-funded Child-Parent Center (CPC) preschool program from the beginning of kindergarten to third-year (grade 3 for most children). Child-Parent Center programs have demonstrated positive effects on educational outcomes and have similar goals as Head Start (Chicago Public Schools, 1987a; Conrad & Eash, 1983). Since it covers the period from 1986-1989, the study represents a good approximation of the present social context in which preschool operates. The sample consists of low-income, minority children in a large metropolitan district. The primary goal of the analysis was to examine the early schooling process leading to achievement since it is during this period that the transmission of effects begin which may shape later adjustment. However, other frequently studied outcomes, including retention and special education placement, were also included. The use of cognitive achievement as the ultimate outcome of preschool is not intended to imply that achievement is the sole outcome of preschool or even the most important. Because preschool was expected to be a major source of observed group differences, the analysis combined preschool and no preschool groups. This total-group analysis allows for a direct test of the mediators of preschool.

A Model of Early School Adjustment After Preschool

A model to describe the mediation of preschool during early schooling is shown in Figure 1. As discussed above, this model considers six factors as mediators of preschool, leading to year 3 cognitive achievement: (1) entering school cognitive readiness, (2) socioemotional maturity as measured by teachers, (3) parent involvement at home and in school, (4) grade retention, (5) special education placement, and (6) school mobility. Sex is included in the model because of its documented relationship with socioemotional maturity and retention; girls are rated higher on teacher ratings of maturity (Reynolds, 1989a) and are less likely to be retained than boys (Holmes, 1989; Lazar et al., 1982).

Insert Figure 1 about here

The basis assumption of the model is that preschool has indirect effects on later achievement through cognitive readiness and school and family factors. An indirect effect is the "extent to which [an] intervening variable accounts for [the] relationship [between a] predetermined and subsequent variable" (Wolfle, 1980, p. 185). Thus, the extent to which preschool is mediated reflects its degree of dependency on intervening factors in exerting effects and specifies how or why effects occur (Baron & Kenny, 1986). The arrows connecting the variables are the effects to be tested. Paths were based on prior research and/or theoretical expectations, although the estimation procedure allows for theoretically justified modifications and alternative models. Two features guided the model.

1. The sequence of effects is based on time precedence defined by the longitudinal design. Cognitive readiness, measured at the beginning of kindergarten is due, in part, to preschool attendance but obviously precedes intervening family and school factors. Parental involvement and socioemotional maturity were measured in years 1 and 2 as indicators of significant others' influence after the end of preschool and may be a relatively powerful early influence on children's

achievement behavior. The remaining variables, assignment to special education, mobility, and retention were life events that cumulated in year 3, subsequent to other factors and were expected to have substantial negative effects on achievement, thereby reducing the long-term effects of preschool.

2. With the exception of sex, the variables are representations of inherently unobservable factors that are measured with error. Fallible measurement is particularly likely with children since their cognitive and affective development are in the early stages and measures are often reported by others (e.g., parents and teachers). Consequently, as part of the estimation procedure estimates of unreliability in measures are taken into account (Hayduk, 1987).

A particular feature of the model is the specified relationship between retention and special education and year 3 achievement. Assignment to special education and grade retention by year 3 were expected to negatively affect achievement at the end of year 3. The negative and harmful effects of retention on achievement, due possibly to labeling or lowered expectations, have been found as early as kindergarten and continue to increase over time (Holmes, 1989; Holmes & Mathews, 1984). Holmes (1989), in a meta-analysis of controlled studies, found a negative effect on achievement of .30 standard deviation units. Assignment to special education (Lazar et al., 1982) and school mobility (Reynolds, 1989a, 1989b) have been negatively linked to achievement and may be influenced by cognitive readiness (see Figure 1). Indeed, along with school mobility, retention and assignment to special education were expected to have a disruptive influence on children's progress as well as the continuing effects of preschool.

Method

Subjects

The 391 ethnic minority (95% black, 5% Hispanic) children in this study are part of the Longitudinal Study of Children at Risk (LSCAR), an investigation tracing the school adjustment of a panel of 1300 low-income, minority children graduating from Chicago's government-funded kindergarten programs in 1986. Of these children, 266 attended Child-Parent Center (CPC) preschool, a comprehensive and intensive program that enrolled 3- and 4-year-olds in six schools that were the original sites of the program. Funded by Chapter 2 of the Educational Consolidation and Improvement Act, a federally supported compensatory education program, the CPC program began in Chicago in 1967 and had similar goals to Head Start, including improving the school readiness of children from economically disadvantaged environments. The only significant difference between programs is that the CPC program has an all-day kindergarten component and Head Start does not. The CPCs offer a language skills program with health and nutritional services, and extra educational services. Parent involvement is a requirement. Each CPC has a head teacher, a parent resource teacher, teacher aides, and a variety of support services, including inservice training for teachers and aides, and supplies and equipment. Evaluations have verified the implementation of the program (Chicago Public Schools, 1986, 1987; Conrad & Eash, 1983). As a compensatory educational program, entry into the CPCs is limited to children in school districts with a high proportion of low-income families. Parents are required to apply at the school in their neighborhood and acceptance into the program is usually limited to the families in most educational and economic need.

The remaining 125 children served as a matched comparison group since they came from the same low-income neighborhoods as the CPC children and enrolled as 5-year-olds in the same all-day kindergarten programs without any known preschool experience. Unlike the CPCs, parent involvement was not a requirement, but parents were welcome to participate in the CPC. Enrollment in the program was open to any child in the school district and required parents to apply at the school. In addition to being matched on neighborhood characteristics, the comparison group did not significantly differ from the

CPC group on age at school entry (Ms of 65 and 64 months, respectively), parental educational background (64% and 63% of responding parents, respectively, indicated they graduated from high school), and eligibility for government lunch subsidies (90% of each group were eligible for a full or reduced subsidy). Although the design of the program did not include random assignment to groups or pretesting of preschool and no preschool children, there was no evidence that self-selection affected the relationship between preschool and cognitive readiness.[1] Since the purpose of the study was to test a theoretical model of the early schooling process rather than to demonstrate an experimental effect of preschool, group equivalence was not required for the implementation of the study.

The final sample of 391 children remaining in the school system at the end of year 3 (1988-1989) represented 78% of the initial sample. This retention rate was consistent with previous studies (Lazar et al. 1982). Although attrition was lower in the CPC group (recovery rate = 82% vs. 72%), a program by attrition interaction term made no significant contribution to the explanation of third-year achievement or retention, net of preschool, sex, and parent education. Attrition was also unrelated to sex and parent education. The small amount (< 10%) of missing data on teacher and cognitive readiness measures were plugged with corresponding subgroup means. The amount of missing data did not differ by program and results of the imputations did not substantially alter the variances or the correlations among variables.

Measures

Preschool. Children on record as being enrolled in CPC preschool in 1983-1984 or 1984-1985 were coded 1; those with no known preschool were coded 0. Since most children enrolled for two years, length of preschool was not included in the analysis. To maintain conceptual clarity between groups, two comparison group children having Head Start preschool were excluded from the analysis. Due to the possibility of coding errors from school records or because a small number of comparison group children could have received preschool outside of the public school before entering government-funded kindergarten, the reliability of the preschool measured was not assumed to be perfect, but was instead estimated at .90 (based on likely coding errors and the low likelihood that comparison-group children attended preschool). Coefficient estimates reported below are adjusted for this reliability as implemented in LISREL.

Sex. Sex was coded 0 for boys and 1 for girls and was taken from the child's central record. To account for any possible coding errors, a reliability estimate of .99 was used in the analysis.

Entering Kindergarten Cognitive Readiness. The comprehensive battery on the fall 1985 Iowa Tests of Basic Skills (ITBS) (Level 5 Form 7) was used as a measure of entering school cognitive readiness or developmental preparedness (Hieronymus, Lindquist, & Hoover, 1980a). The test measures a broad array of readiness skills including listening, word analysis, vocabulary, language, and mathematics. Reported internal consistency reliability is .94, which was used as the estimated reliability in the analysis. This coefficient reflects the large number of items in the test, but is impressive given the age of children tested. Research has confirmed the measure's predictive validity on later achievement (Reynolds, 1989a). Although it is not a measure of IQ, cognitive readiness on school entry is a major goal of nearly all preschool programs for children at risk. Scores were scaled in grade-equivalencies.

Teacher ratings of socioemotional maturity. In the spring of 1987, grade 1 teachers assessed children's school progress by completing an 18-item scale coded on a Likert-type scale from poor or not at all (1) to excellent or much (5). Six items defined socioemotional maturity and were supported by principal components analysis: (1) came to my class ready to learn, (2) completes work according to instructions (3) complies with classroom rules (4) displays confidence in approaching learning tasks, (5) works and plays well with others, and (6) participates in group discussions. The scale had an alpha reliability of .92 and has been used in previous studies with this sample (Reynolds, 1989a, 1989b). It was also similar to previous measures of maturity in young children (e.g., Berrueta-Clement et al., 1984; Entwisle, Alexander, Cadigan, & Pallas, 1987).

Parent involvement. Two perceptual measures of parent involvement at home and parent involvement in school were obtained to estimate parents' commitment to their children's schooling after preschool. As an indicator of home involvement, parents, in second-year, rated from never (1) to every day (7) the frequency they: (1) read to child, (2) cook with child, (3) take child on outings, and (4) talk with child about school. The four-item scale had a moderate internal consistency (alpha = .51) and its unidimensionality was verified by confirmatory factor analysis.[2] As an indicator of school involvement, first-year teachers rated, in addition to levels of maturity, parents' participation in school activities from 1, poor/some to 3, above average/excellent, which was recoded from the 5-point scale for improved reliability and conceptual clarity. Although teacher report may not be completely representative of parent involvement in school, the focus on general school relations is clearly an area in which teachers have knowledge (Reynolds, 1989b; Stevenson & Baker, 1987). Moreover, teacher ratings were only measures available of involvement in school in year 1, a critical time to measure parent involvement due to its close proximity to the end of preschool. The use of teacher report was supported by principal components analysis, which suggested its relative independence from measures of school progress. Also, previous research with this sample has indicated a significant relationship between parent and teacher reports of parent involvement in school (Reynolds, 1990).

Assignment to special education. Any child assigned to special education classrooms in year 1, year 2, or year 3 were coded 1; all others were coded 0. This defined a cumulative classification of placement. Of the total sample, 3% were placed in special education in year 1, 5% in year 2, and 8% in year 3. Being a single indicator, reliability was estimated at .95.

School mobility. This measure was defined as whether a child changed schools between kindergarten and year 3. For both groups, one-third of the children changed schools at least once. Because a relatively small number of children changed schools two or more times (31 or 8%), a dichotomous distinction was used in the analysis. This coding maintained consistency with grade retention and placement in special education. As with special education placement, reliability was estimated at .95.

Grade retention. Children retained in kindergarten, year 1, or year 2 were coded 1; children continuously promoted were coded 0. Lack of a sufficient number of children retained in any one particular year precluded separate analysis by year as less than 1% were retained in kindergarten, 7% were retained in year 1, and 12% were retained in year 2. Similar to mobility and special education placement, reliability was estimated at .95.

Year 3 reading and mathematics achievement (READ-3 and MATH-3). Spring 1989 Iowa Tests of Basic Skills (ITBS) reading comprehension and math total grade-equivalent subtest scores (Level 8 or 9 Form 7) measured cognitive achievement (Hieronymus et al., 1980b). The reading comprehension subtest includes 44 multiple-choice items (Level 8 has 67 items) on recognizing facts, making inferences, and developing generalizations from textual material. The mathematics total subtest contains 90 multiple choice items (Level 8 has 88 items) divided into concepts, problems, and computation. Both have high internal consistency reliabilities (READ-3, Rel. = .91; MATH-3, Rel. = .94). Scores were grade-equivalencies and the subtests formed a latent construct of year 3 achievement.

Data Analysis

The model was estimated by latent-variable structural equation techniques (LISREL 7, Joreskog & Sorbom, 1988a). Latent-variable models are particularly suited for testing longitudinal models with intervening variables and have as their primary strength the incorporation of measurement error and construct validity considerations into the estimation procedure, thereby yielding more precise effects (Anderson, 1987; Anderson & Gerbing, 1988; Gollob & Reichardt, 1987). The following LISREL features were implemented in this study after it was determined that the assumptions regarding sample size and multivariate normality were met:[3] (1) full information maximum likelihood estimation; (2) whenever possible, multiple indicators were used to improve construct validity and reduce measurement error;

otherwise reliabilities of single-indicator factors were estimated from the data collection procedures (Hayduk, 1987); (3) the analyzed matrix was based on polychoric and polyserial correlations estimated by the LISREL preprocessor, PRELIS (Joreskog & Sorbom, 1988b), which have shown to yield the most precise estimate of linear association;[4] and (4) assessment of fit was based on multiple criteria including interpretability, magnitude of effects, the chi-square ratio, the adjusted goodness of fit index (Joreskog & Sorbom, 1988a), the root mean square residual, and comparison of models. Although the use of structural modeling generally strengthens causal inferences, particularly with longitudinal data, these inferences are based on theoretical specification and are hardly certain (Holland, 1986). For a complete discussion of issues surrounding structural modeling see Anderson and Gerbing (1988), Connell and Tanaka (1987), Cuttance and Ecob (1987), Hayduk (1987), and Mulaik (1990).

Results

Descriptive statistics of the observed variables for CPC preschool and comparison groups are shown in Table 1. Results indicated a number of findings that are consistent with previous research. Preschool children, on average, entered school with higher levels of cognitive readiness, were rated higher by their year 1 teachers on socioemotional maturity, and had parents who were more involved at home and in school. As found in previous studies, CPC preschool children were retained less often than their comparison counterparts from kindergarten to year 3 (9% to 18%) and were higher on reading and math achievement (about one-third of a standard deviation).[5] However, the groups did not differ on school mobility and special education placement. Further analysis, however, revealed the tenuous nature of these observed differences. In regression analyses predicting year 3 achievement, differences between groups disappeared after taking into account differences in sex and retention. Differences in retention also disappeared after taking sex into account. These results indicate that other factors need to be accounted for in explaining preschool differences over time.

Insert Table 1 about here

The Measurement Model

Following Anderson and Gerbing (1988), the measurement model defined in Table 1 was estimated prior to structural estimation. The measurement model yielded a good fit with the data $X^2(67, N = 391) = 137.50$, Chi-square ratio = 2.05, AGFI = .917, RMR = .029, and the manifest variables loaded highly and significantly on their respective latent factors. Loadings of indicators of socioemotional maturity (rs = .90, .91., .74, .94, .85, and .72, respectively) and year 3 achievement (rs = .91 and .86 for reading and math respectively) were high. Regarding parent involvement, however, loadings for teacher ratings of school involvement and parent ratings of home involvement were lower (rs = .57 and .21, respectively) and indicated differential precision of measurement.

The correlations among latent factors of the model are displayed in Table 2. Note that the correlations are adjusted for measurement errors and correlations among measurement errors in the manifest variables, thus, are higher and probably more accurate than correlations among observed variables.[6] The patterns indicate that the measures tap separate but related aspects of school adjustment. The preschool-achievement correlation declined substantially from kindergarten entry (cognitive readiness; $r = .37$) to the end of year 3 ($r = .13$), suggesting fading effects that have been consistently noted in the literature. Among the highest correlations were preschool and parent involvement ($r = .73$) and cognitive readiness and third-year achievement ($r = .58$), which indicates the predictive power of entering school readiness on achievement nearly four years later. Retention ($r = -.51$), school mobility ($r = -.40$) and special education placement ($r = -.13$) were negatively correlated with year 3 achievement. On the other

hand, two other intervening variables, parent involvement (r = .54) and socioemotional maturity (r = .56) had moderate positive associations with year 3 achievement. Correlation between parent involvement and the other factors are likely overestimated due to the differential loadings of the manifest variables and should be interpreted with caution.

Insert Table 2 about here

The Preschool Model

The results of the final mediated preschool model are displayed in Figure 2. The arrows connecting the latent factors represent significant effects at the .05 level and standardized effects are provided. As expected, there was substantial mediation of preschool. Although paths were complex, cognitive readiness, socioemotional maturity, and parent involvement were primary mediators of preschool on year 3 achievement. Like achievement, preschool influenced retention indirectly rather than directly, which contrasted with the hypothesized model. Note that special education placement was dropped from the final model because it did not mediate the effect of preschool or any other variable. This could be due to the small number of children placed in special education by year 3.

Insert Figure 2 about here

The fitting procedure that led to the final model is shown in Table 3. The summary of effects of the factors are given in Table 4. As shown in Table 3, the final model fit the data reasonably well statistically X^2 (70, N = 391) = 167.93, Chi-square ratio = 2.400, AGFI = .912; RMR = .045, and compared favorably to the initial model in Figure 1 (which had direct effects on retention and special education placement) and two reduced form models without special education placement and noncontributing paths.[7] The variance explained in year 3 achievement by the model was substantial (R^2 = 56%). Retention (R^2 = 24%), school mobility (R^2 = 5%), parent involvement (R^2 = 23%), socioemotional maturity (R^2 = 32%), and cognitive readiness (R^2 = 14%) were less well explained by the model.

Insert Table 3 about here

The summary of direct (unmediated), indirect (mediated), and total effects (unmediated plus mediated) in Table 4 indicate that preschool had substantial indirect effects on year 3 achievement (b = .28) and grade retention (b = -.20), although it should be noted that its immediate direct effect on cognitive readiness was its greatest effect (b = .37, see Figure 2). However, the effects of intervening variables were generally greater than preschool, which suggests the relative power of the intervening factors in affecting year 3 achievement. For example, cognitive readiness had a substantial direct (b = .35) and indirect effect (b = .19) on year 3 achievement that summed to a total effect of .54. This indicates the pervasive influence of cognitive readiness on primary grade achievement that is only partially attributable to preschool. Socioemotional maturity, school mobility, and retention also had substantial effects on year 3 achievement in the expected direction, although their influence was primarily unmediated.

Insert Table 4 about here

Preschool Mediators

As noted earlier, the indirect effect of preschool on year 3 achievement is a measure of its dependence on intervening factors in transmitting influence. Preschool's relationship with year 3 achievement was primarily mediated by four pathways, all of which are displayed in Figure 2.

Not surprisingly, entering cognitive readiness was the largest source of preschool's indirect effect (b = .130 or .37 x .35, see Figure 2) on year 3 achievement, which is nearly one-half (46%) of its aggregate indirect effect. This result indicates that preschool's continuing influence on later achievement depends, in large part, on cognitive readiness, although its direct effect on cognitive readiness was substantial and further supports the importance of preschool at a critical time of school entry. This dependency supports the role of cognitive readiness as a critical element in early school success. That preschool had no direct effect on year 3 achievement indicates there was no differential cognitive growth between groups from kindergarten and year 3 net of other factors, since cognitive readiness is a baseline measure of achievement at school entry.

The three other sources of mediated effects of preschool were at least one-third the size of the preschool-cognitive readiness-achievement link. The second strongest link was preschool-cognitive readiness-socioemotional maturity-achievement (b = .043). This complex path indicates a school context dependency in which cognitive readiness leads to higher ratings of socioemotional maturity and, consequently, higher year 3 achievement. Thus, positive teacher assessments appear to reinforce the benefits of preschool which is carried forward in the schooling process.

A third mediated effect of preschool on later achievement involved socioemotional maturity by itself (b = .039). Most importantly, this result indicates that preschool is not completely dependent on cognitive readiness to transmit its influence to later outcomes. The benefits of preschool are affective as well as cognitive. Teachers' ratings of children, at least partially due to children's preschool experience, appear to reinforce childrens' learning behaviors.

The fourth mediated path through which preschool effects were transmitted was parent involvement and school mobility (preschool-parent involvement-school mobility-achievement, b = .021). Children having preschool and whose parents provide a supportive and stable environment for learning appear more likely to benefit from preschool as well as do better in school. Thus, preschool continued to influence later achievement by affecting the family environment.

Because parent ratings of home involvement and teacher ratings of school involvement loaded differentially on their latent factor, the model was estimated separately for each indicator. Results indicated that while teacher-rated school involvement reproduced the preschool-parent involvement-school mobility pathway, parent-rated home involvement did not. This indicates that school involvement rather than home involvement transmitted the effect of preschool in the model. This finding was not an artifact of measurement since a secondary measure of school involvement (rated by a subsample of parents) produced similar results, although the magnitude of the indirect effect was smaller. That parent involvement at home did not contribute much to the transmission of preschool effects may reflect a lack of adequate measurement of the home environment or, more likely, the lack of sufficient variation in the measure due to survey nonresponse.

Although retention played a role in the transmission of achievement effects by influencing socioemotional maturity (b = .012), the indirect effects of preschool on retention (apart from achievement) were notable. As with achievement, cognitive readiness, socioemotional maturity, and parent involvement were mediators that transmitted the effects of preschool on retention (see Figure 2). The complex path involving preschool-parent involvement-retention was the greatest in magnitude (b = -.053 or .35 x .15), followed by preschool-cognitive readiness-socioemotional maturity-retention (b = -.050), preschool-socioemotional maturity-retention (b = -.045), and preschool-cognitive readiness-retention (b = -.041). These paths indicate intervening dependencies of preschool in affecting school decisions of retention. Children who attend preschool are less likely to be retained only to the extent that they begin

kindergarten with higher levels of readiness, display higher socioemotional maturity to their teachers, or have parents who are more involved in their education. That no direct effects between preschool and retention were found suggests the important role of intervening factors in explaining school adjustment. Most illustrative of the influence of intervening factors is that while preschool children were more likely than comparison children to score high on the mediators both singly (e.g., 65% of preschoolers scored above the median on cognitive readiness vs. 18% for comparison children), and in combination (e.g., 45% of preschoolers had high cognitive readiness and high ratings [> 19] of socioemotional maturity vs. 9% for the comparison children), mean achievement did not differ between preschool children with these high scores and comparison children with these high scores. For example, preschoolers with high cognitive readiness did no better on year 3 achievement than comparison group children who also had high cognitive readiness. These results provide further evidence that differences among groups are not directly attributable to preschool but rather to intervening factors.

Discussion

This study investigated mediators of preschool in order to determine the process by which preschool affects school outcomes four years later. Results support, to some degree, a social context view of the transmission of preschool effects. School and family factors as well as cognitive readiness substantially mediated the effect of preschool on grade retention and achievement by year 3. The effects of preschool were more likely to be passed on if children entered kindergarten at higher levels of readiness, if teachers positively rated children's progress, if parents supported their children through involvement in their education and by providing home/school stability, and if children were not retained in grade. These factors appear to be links in early schooling that help transmit the effects of preschool as well as contribute to the stability of academic performance. Although preschool had significant and substantial indirect effects on both retention and achievement, intervening factors played a greater role in school adjustment.

That cognitive readiness in kindergarten was the primary transmitter of effects to achievement and grade retention was not surprising and indicates its importance in directing children toward school success. Preschool appears to improve, but does not fully compensate for cognitive readiness' role as a primary early influence on measures of school adjustment. The importance of cognitive readiness as a primary mediator of preschool is consistent with Berrueta-Clement et al's., (1984) follow-up of the Perry Preschool program in which they found a nearly identical effect of preschool on cognitive readiness that was then transmitted through the schooling process. However, in this study, the indirect effect of preschool and the direct effect of cognitive readiness on year 3 achievement were considerably larger since the focus was specifically on the early schooling process. The pervasive effects of cognitive readiness are consistent with previous studies (Butler et al., 1985; Carter, 1984; Evans, 1985; Gersten, Becker, Heiry, & White, 1984; Reynolds, 1989a) and indicate that many of the decisions made about children are based, in part, on school readiness. It should be noted that the strength of the relation between cognitive readiness and year 3 achievement may be due to unmeasured factors (e.g., early home environment), although these factors would not substantially change the interpretation of the influence of cognitive readiness.[8]

Socioemotional maturity as rated by teachers was also an important mediator of preschool on retention and achievement, independently, and in conjunction with cognitive readiness. Preschool children were perceived as better adjusted and more academically oriented than comparison children. Consequently, teachers may have accorded them higher expectations which may have reinforced children's positive attitudes toward school and their expectations and motivations. Due to this reinforcing process of teacher support, children may be less likely to experience debilitating problems such as grade retention and more likely to be satisfied and engaged in school.

Many investigators have indicated that continuing and consistent parent involvement and support after preschool may mediate its effect (Bronfenbrenner, 1975; Wachs & Gruen, 1982; Woodhead, 1988) based

on the rationale that to exert lasting effects, preschool must influence the home environment. Results of this study provide some empirical support for this view. The effect of preschool was more likely to be passed on to achievement if parents were both involved in their children's education after preschool and if their children did not change schools, which in all likelihood reflects the families' home stability. This finding was further supported by separate analyses using teacher ratings of school involvement and parent ratings of school involvement (albeit a reduced sample). That parental involvement at home did not contribute to the model by itself in a separate analysis was surprising and may be due to an insufficient sampling of the domain of home involvement or of the sample itself.

The positive effect of preschool on parent involvement in school is consistent with the goal of the CPC preschool program to enhance the family-school relationship. This involvement by parents at home and in school may create a positive climate for learning that bolsters a family's commitment to the school that makes school mobility less likely, thereby aiding adjustment or, rather, helping prevent the environmental disruption (and other related problems) caused by moving. It is possible, of course, that the preschool-parent involvement-mobility-achievement path reflects unmeasured factors that are associated with both parent involvement and mobility, including economic hardship, marital discord, or lack of social support. As Slaughter and Epps (1987) noted, "the daily struggle for survival takes precedence over all other concerns" (p. 20). However, to the extent these unmeasured factors are related to factors included in the model, this explanation is unlikely. Furthermore, since the variance in parent involvement and mobility were not explained well in the model, more detailed studies are warranted. Future studies would also benefit from more detailed measures of parental influence, including parental attitudes, family climate, and family socialization.

Grade retention had a substantial effect on year 3 achievement and was involved in transmission pathways involving cognitive readiness, socioemotional maturity, and parent involvement. As expected, retention appears to function as both a cause (it was influenced by cognitive readiness) and effect (it negatively influenced year 3 achievement) of achievement. Its negative influence on achievement net of other factors, however, suggests that the school practice of retention undermines both adjustment and the continued effects of preschool. Unfortunately, because the effect of retention increases over time (Holmes, 1989) and more children are retained over time, difficulties in adjustment may just be beginning. That preschool had no direct effect on retention is likely attributable to the powerful influences of cognitive readiness and teacher assessments.

The Context of Preschool

Although preschool's contribution to early school adjustment should not be trivialized, the results of the model indicate the greater role of intervening factors as times goes on, particularly teacher judgments, the school practice of retention, and school mobility. Because of these strong intervening influences, it is not surprising that preschool effects fade over time and children experience adjustment problems. These findings suggest that research focusing only on group differences attributable to preschool misses the larger story involving factors that, by themselves, have a much greater impact on school adjustment. This is no more apparent than in the increasing role of retention and school mobility over time versus the fading direct effects of preschool. As Woodhead (1988) noted, research on early intervention may place too much emphasis on the early years thereby displacing the "many other factors besides the preschool program that contributed to the transmission of its effects" (p. 452). This study indicates that the life events of retention and school mobility should be a focus of such attention.

The dependency of preschool on intervening factors in exerting its effects raises two implications. The schooling process in this study indicates that the effect of preschool will vary from one social context to another, depending on the interrelationships between preschool and intervening factors. Consequently, certainty about the generalizability of effects is reduced. Cross-validation of this and other studies utilizing mediated models will be of great importance in this effort. On the other hand, because the early schooling

process is a network of inter-related effects, there are numerous ways to alter childrens' pattern of adjustment to extend and reinforce the effects of preschool. For example, improved cognitive readiness due to factors unrelated to preschool (e.g., early home environment), consistent family involvement in children's education, and avoidance of life events such as grade retention and school mobility may change the system of effects for the benefit of children.

Despite its correlational design and the necessarily tentative inferences that are drawn, this study provides empirical support for substantial mediated effects of preschool through a complex array of individual, school, and family factors. Whether it is cognitive readiness, socioemotional maturity, or parent involvement, these factors are critical not only for continuing the effects of preschool but for explaining children's school adjustment and success. Although the model tested represented the data well and explained a substantial amount of information in year 3 achievement and retention, intervening factors (school mobility, parent involvement, and cognitive readiness) were not well explained. Future investigations of processes leading to these factors would be informative. Also, it is important that the process tested in this study be verified in other contexts and for other interventions, including Head Start.

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NOTES

1. Selection bias analysis indicated no evidence for the influence of an unmeasured variable affecting the relation between preschool and entering cognitive readiness, which would be expected if groups were nonequivalent. For this analysis, a LISREL model was tested whereby enrollment into preschool was defined as a function of age, sex, school SES, and parent education, all of which lead to cognitive readiness in kindergarten, an outcome on which substantial effects of preschool have been consistently found. A significant unmeasured common cause (e.g., parent motivation or attitudes) operating to bias the observed relationship between preschool and entering readiness was not found (detected in the Psi matrix). Even if unmeasured differences did affect the observed relation between preschool and cognitive readiness it was likely to be offset by the fact that entry into CPC preschool was awarded to the most disadvantaged, which by itself would underestimate the immediate effect of preschool (see Lee, Brooks-Gunn, and Schnur, 1988, regarding this issue in research on Head Start).

2. Parent ratings of home involvement were available for only 40% of the sample. However, analysis revealed that missing data on this measure were unsystematic across the sample and did not independently contribute to the explanation of variance of variables in the model. Thus, available data were used as proxies for the total sample.

3. Cuttance (1987), summarizing robustness studies in structural equation modeling, indicated that sample sizes greater than 200 are required to achieve stable coefficient estimates and standard errors against moderate departures from multivariate normality. In this study only two variables, retention and special education placement, had relatively high (> 2.0) skewness in which test statistics would be underestimated. Consequently, inclusion of paths involving these factors was based on the magnitude of their coefficients. Because the Chi-square test appears to be more sensitive (models are more likely to be rejected falsely) to departures from normality, other fit statistics were used as heuristic guides of model fit, including the ratio of Chi-square to degrees of freedom, the adjusted goodness-of-fit index, the root mean square residual, and model comparisons. However, substantive interpretation was the major determinant of the final model.

4. PRELIS computes correlations not as a pair of observed scores but as the "correlation between two latent variables n and e underlying y and x, where n and e are assumed to have a bivariate distribution" (p. 1 - 24). Although Joreskog and Sorbom (1988a) recommended the use of an asymptotic covariance matrix with a polychoric correlation matrix and estimation by weighted least squares, they reported no clear differences between maximum likelihood and weighted least squares using a polychoric matrix. However, Joreskog and Sorbom (1988a) suggest that future research is needed.

5. These test scores may be overestimated since they are based on 1977-1978 norms. A comparison of grade 3 norm group scores between 1977-1978 and 1984 suggests the overestimation may be as high as three months in reading comprehension and two months in mathematics total (Hieronymus & Hoover, 1986).

6. The following correlations among measurement errors were estimated as part of the measurement model: socioemotional maturity-2 and socioemotional maturity-3, .054; socioemotional maturity-2 and socioemotional maturity-5, -.041; socioemotional maturity-2 and socioemotional maturity-6, .075; socioemotional maturity-3 and socioemotional maturity-6, .232; socioemotional maturity-3 and teacher rating of parent involvement, .116; socioemotional maturity-6 and teacher rating of parent involvement, .162.

7. Noncontributing paths were defined as those that had no significant direct, indirect, or mediated effects on either retention or year 3 achievement. This procedure is consistent with the desired goal of model parsimony.

8. For parsimony and due to missing data, parent education (high school graduation or otherwise) was not included as a primary variable. Moreover, parent education was also unrelated to preschool and when added to the model the statistical significance of other coefficients and the pattern of results did not change. Parent education had significant effects on cognitive readiness, parent involvement, mobility, and year 3 achievement.

Table 1

Means and standard deviations of observed variables for preschool and no preschool groups

Variable	CPC preschool (n = 266) M	CPC preschool (n = 266) SD	No Preschool (n = 125) M	No Preschool (n = 125) SD
Sex (1 = girls)	.52	.50	.45	.50
Cognitive readiness*	.17	.40	-.11	.26
Socioemotional maturity (Year 1):*				
Readiness to learn	3.62	1.12	2.86	1.10
Completes work	3.64	1.06	3.00	.92
Complies with rules	3.39	1.03	2.98	.96
Displays confidence	3.56	1.05	2.94	.95
Works well with others	3.67	.97	3.05	.96
Participates in discussion	3.61	1.07	3.22	.96
Parent involvement (Year 2):*				
Parent rating (home)	20.31	3.96	18.57	4.38
Teacher rating (school)	2.08	.74	1.46	.71
School mobility	.33	.47	.33	.47
Retention*	.09	.29	.18	.38
Special education	.09	.28	.11	.32
Year 3 achievement:				
Reading*	3.70	1.08	3.45	1.13
Mathematics*	3.81	.90	3.61	.91

Note. Means for sex, school mobility, retention, and special education are proportions. For these variables significance tests were based on the Chi-square test, otherwise t-tests were used. Results for socioemotional maturity were based on the total scale score. Minimum and maximum values for ratings: socioemotional maturity items (1, 5), parent involvement at home (7, 28), teacher rating of parent involvement at school (1, 3).

* $p < .05$

Table 2

Correlations among latent factors

Factor	Sex	Preschool	Cognitive Readiness	Socemot Maturity	Parent Involv	School Mobility	Retent	Special Educ	Year 3 Achiev
Sex	1.000								
Preschool	.074	1.000							
Cog Readiness	.044	.373	1.000						
Socemot Maturity	.219	.337	.516	1.000					
Parent involv	.251	.728	.446	.682	1.000				
Sch mobility	-.088	.007	-.114	-.105	-.337	1.000			
Retention	-.195	-.134	-.322	-.455	-.504	.225	1.000		
Special Educ	-.080	-.044	-.071	-.114	-.184	.053	.104	1.000	
Year 3 achiev	.217	.125	.580	.562	.535	-.396	-.507	-.131	1.000

Note. Correlations estimated from measurement model and are adjusted for measurement error and correlations among measurement error. Values of .100 and above are significant at the .05 level. Cog Readiness = cognitive readiness; Socemot maturity = socioemotional maturity; Special Educ = special education; Year 3 achiev = year 3 achievement.

Table 3

Standardized effects on year 3 achievement and grade retention

Factor	Direct Effect	Indirect Effect	Total Effect
	Year 3 achievement		
Sex	-	.09	.09
Preschool	-	.28	.28
Cognitive readiness	.35	.19	.54
Socioemotional maturity	.26	.07	.33
Parent involvement	-	.09	.09
School mobility	-.28	-	-.28
Retention	-.22	-	-.22
	Retention		
Gender	-.09	-.08	-.17
Preschool	-	-.20	-.20
Cognitive readiness	-.11	-.16	-.27
Socioemotional maturity	-.30	-	-.30
Parent involvement	-.15	-	-.15

Note. All effects are significant at the .05 level. Coefficients are adjusted for measurement error. Two across-equation correlations were estimated to control for the effects of unmeasured factors (r = .28, socioemotional maturity and parent involvement; r = .14, school mobility and retention).

Table 4

Models estimated in the fitting procedure

Model	X^2	df	X^2 / df	X^2 change	df change	AGFI	RMR
1. Initial model in Figure 1	263.42	81	3.25	-	-	.873	.079
2. Reduced model 1 with special ed. and paths deleted	278.60	74	3.76	15.18	7	.865	.085
3. Reduced model 2	192.73	73	2.64	85.87	1	.901	.054
4. Final model	167.93	70	2.40	24.80	3	.912	.045

Note. AGFI = adjusted goodness of fit index; RMR = root mean square residual.

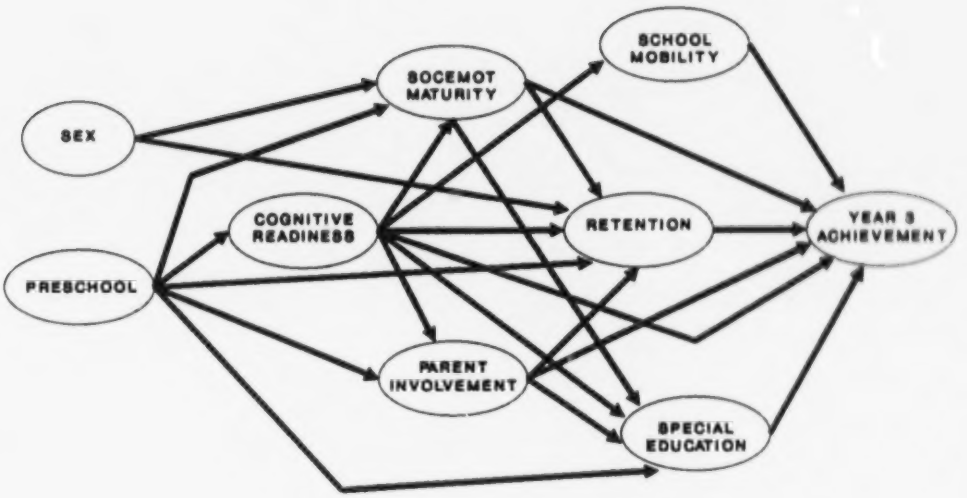

Figure 1. Hypothesized Mediated Preschool Model.
Socemot maturity = socioemotional maturity

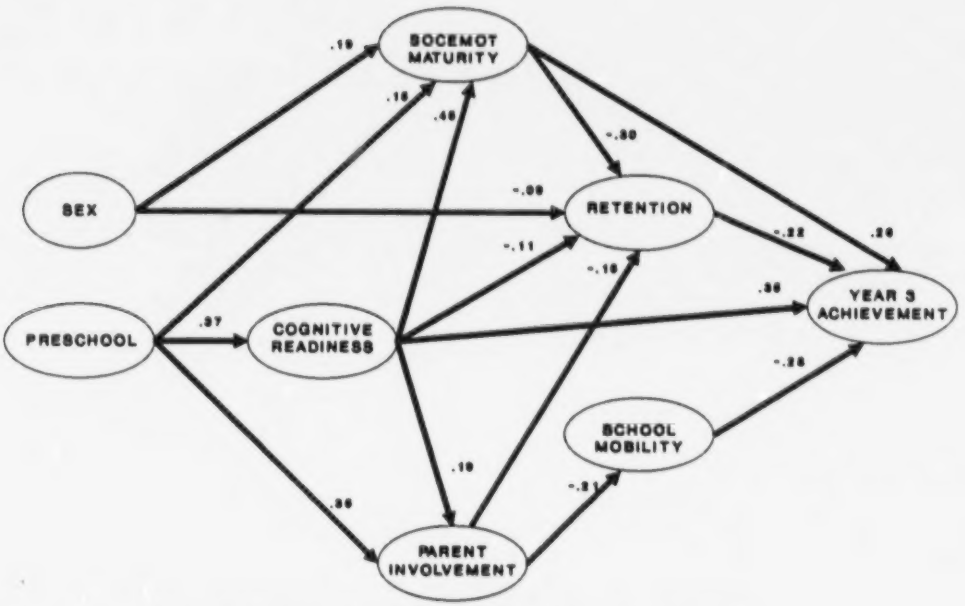

Figure 2. Final Mediated Preschool Model. All coefficients are standardized and significant at the .05 level. The path from sex to parent involvement (b = .13) is not shown.

Section 5

Study 2: An Investigation of Factors Associated With Reading Growth

Nikolaus Bezruczko and Arthur J. Reynolds

Understanding the influence that a background of poverty has on the performance of children during the schooling process has many aspects. One is the relationship between a student's family background and the schooling process, and the growth of reading ability. LSCAR provides an opportunity to systematically examine this relationship by providing key information about the family background of children-at-risk, their attitudes and opinions, as well as the attitudes and opinions of their parents and teachers, concerning the schooling process. This study shows how this information, together with advancements in item scaling methodology, enables researchers to solve two problems associated with the study of reading growth.

The first problem concerns the methodology that is used to numerically represent reading growth. A second problem is establishing a theoretical model that describes the systematic influence of child background and schooling on reading growth. The first of these problems, and the approach taken to it in this study, is described below. The second problem, an investigation into reading growth, will follow.

The Measurement Problem

Child development researchers have discussed the problem that observations based on raw scores have for understanding growth (Burchinal & Appelbaum, 1991), emphasizing that differences based on raw score units do not represent equal differences in underlying ability. According to measurement researchers (Angoff, 1972; Torgerson, 1958), the quantities represented by raw scores are not isomorphic with the quantities of the underlying trait being measured. This is a problem that is important to all social researchers but which holds special problems for the study of mental growth.

The study of growth, in general, focuses on some attribute of interest that changes over time and has functional relationships to other variables. Because extended growth generally occurs at different rates, rapidly at the beginning of a growth cycle and much slower near its end, measurement methods that capture this difference in rate improve the accuracy with which functional relationships to other variables can be described. Because raw scores, as well as other methods of assigning numbers to observations, have an unknown relationship to the quantities that underlie growth, they are not considered appropriate for describing growth.

An alternative to using raw scores to describe growth are methods that index scores to the performance of standard samples which indicate the relative amounts of growth that scores represent. Unfortunately, the representativeness of empirical samples that are used for making comparisons is always a question because specific samples usually differ to some degree from idealized standards, which in time are inadequate for even idealized comparisons. Consequently, numerical indexes based on the reference to standard samples are fundamentally flawed when used to describe growth.

Item Response Theory

A solution to the problem of invariance, found with measures based on reference groups, is the development of theories of item responses (Lord & Novick, 1968) or Item Response Theory (IRT) in which test scores are related, not to the performance of reference samples, but to the quantitative characteristics of a mathematical function. Unlike the changing characteristics associated with reference groups, the mathematical function offers an invariant structure against which to compare test scores. Because the mathematical function is selected for specific properties that are necessary for measurement such as linearity, additivity, and intervality, test scores that are accurately represented by the mathematical function can, in many applications, be assumed to have the numerical properties of measures.

Transformation of scale units

Because of the advances offered by IRT, the ITBS reading scores in this study of reading growth were transformed to equal interval scale units based on the measurement requirements of the one-parameter

logistic, as formulated in the Rasch measurement model (Wright & Stone, 1979; Wright & Masters, 1982). The results of this transformation are presented below.

Figure 1 shows the growth of reading ability for the students in this study when they were tested with a standardized test of reading achievement whose scores were transformed to logits--from the time of their entry into kindergarten through four successive years of schooling. Consequently, these results show the amount of growth that occurs over time for scale units of equal magnitude.

Insert Figure 1 about here

The growth curve shows the familiar characteristics of rapid change during early growth and its diminishing rate over the course of development. Comparing the empirically obtained growth curve to the expected growth growth curve shows the early advantage these children received from early childhood intervention--despite their background of poverty, as well as the diminishing effect of this intervention. The results, however, show that by year 2 or the middle of grade 2 significant departures from normative expectation occur, with the discrepancy increasing through subsequent years.

In the following section, an investigation is conducted into the factors that influence the terminal stage of this growth curve, reading achievement in grade four.

The Problem of Describing the Factors That Influence Reading Growth

This investigation into the factors that influence reading growth assumes a theoretical model in which many factors influence the ability to read. Some of these factors are associated with the economic resources available to a family, while others are associated with the schooling process. Yet others are associated with chance events that occur to a child during growth that may diminish or enhance it.

The factors that are associated with the economic resources available to a family are expected to influence the characteristics of the home social environment, thus are related to the formation of social values and attitudes that a child takes into the school environment. These values, in turn, are expected to establish the foundation on which attitudes toward school and learning are formed. Financial poverty in the home, for example, is expected to influence the interaction between parents and children so that the effectiveness of parental reinforcement during child rearing is diminished. Likewise, the formal education of parents is expected to influence their child rearing practices, which in turn may be related to the encouragement they provide their children for school achievement.

Extended financial poverty is also expected to diminish the intellectual stimulation that families provide their children, such as the continuous exposure to novel and varied experiences which may inhibit the cognitive assimilation of relationships in the environment by these children. Researchers have already established a clear association between poverty and social problems such as alcoholism and mental illness which should also influence child rearing.

Other factors in a child's background are expected to influence school performance and in particular reading growth. The structure of the family unit, parental expectations and aspirations, role models and so on are expected to have a pervasive influence, affecting the child's experiences throughout the school years and subsequent behavior in the community.

While these factors show an understanding into the process of growth for educationally-at-risk children, they present a problem to researchers because first, they are diverse and numerous, and second, because they are only examples of many other independent influences on children's growth. Consequently, a conceptual model is needed that comprehensively demonstrates the significant influence that these factors have on growth, yet which is concise and efficient. The section below presents a model that describes the influence that factors have on reading growth.

A Proximity Model

In this study of reading achievement, the association between the factors in a child's physical and social environment and mental development are assumed to be governed by a principle sometimes known as proximity. Researchers (Elkind, 1976; Haller, 1982; Vygotsky, 1978), have presented differing perspectives on the proximity principle and in this study it refers to a progression that occurs, both in the competency of the child's interactions with the environment and the relative importance that factors have on development. Thus it describes the dependence of the child during his or her earliest development on the immediate environment, which is the basis on which the child constructs an understanding of reality. From these experiences in the immediate environment, the child develops competency with events in the distal environment.

The proximity principle also describes a systematic shift in the influence that factors have on a child's general development of competence, as well as specific reading ability. As the child gains competence, factors shift in their importance from the home to factors in the schooling process and the broader community. According to this progression, the growth that occurs in the narrow context of the home is the prerequisite and the foundation for the extended growth that occurs, later, in school and the community.

Because the relationship of factors, according to the proximity principle, is temporal and cumulative, factors in the home environment should have an influence on the development of attitudes and values, as well as cognitive attributes, that later influence school performance. Because the proximity principle refers to the general intellectual development of a child, it assumes the acquisition of reading ability yet is not limited to it.

Categorizing the Factors Related to Growth

The proximity principle is useful to researchers because it forces an organization of their observations into a few categories that are expected to have an independent influence, in this study, on reading achievement. Consequently, the proximity principle, in this study, is operationally defined in terms of three categories that influence reading growth. These categories are described below.

The first category consists of factors that arise from a child's personal characteristics together with characteristics of the home and preschool experience (family-demographic and preschool factors) that influence cognitive readiness and attitudes associated with motivation toward school and learning. This category is expected to influence the receptivity of children to the schooling process, thus enhance their acquisition of school learning.

A second category consists of outcome factors that arise early in a child's schooling (early outcome factors) such as cognitive readiness and the motivation for learning associated with preschool intervention.

A third category consists of intervening experiences which are factors that are generated by the schooling process (school based factors), itself, that intervene between the influence of family and preschool factors and reading achievement in grade 4, and other factors representing transitional life events (transitional life events). These transitional life events are unique episodes during a child's school years that serve either to promote or diminish school performance. Mobility, stability of family structure, illness, and so on are examples of special events, both outside of the schooling process and sometimes part of it, that can influence growth, sometimes dramatically.

Means and standard deviations for the factors in each of the corresponding categories are shown in Table 1 for the longitudinal study. Correlations among the factors are shown in Table 2 and indicate they tap separate but related constructs of schooling.

Insert Table 1 and 2 about here

Description of the Categories

As shown in Table 1, the factors are divided into three groups. The family-demographic and preschool factors include traditional child, family, and school background factors that are associated with academic

achievement. The child factors include sex and age at entry in kindergarten. The family variables include parent education (high school graduate or not), and an indicator of income, a child's eligibility for a federal lunch subsidy. Both were obtained in years 2 and 4 through parent survey questionnaires. Although these socioeconomic variables were measured after children's school entry, they were expected to be fairly stable indicators, especially given the sample's at-risk attributes. Because of substantial missing data on parents education and income, a missing-data dummy variable was created to test for nonresponse bias in the analyses.

As a measure of family structure, the child-reported number of brothers and sisters was obtained from the year 3 child survey. It should be noted that parental marital status, surveyed in year 4, was not included as a primary variable due the small number of parents who provided this data ($\underline{n}$ = 492) and that it added no explanatory power above and beyond other variables. The final sociodemographic factor was school SES in kindergarten which reflects the socioeconomic context of the kindergarten school and the likely area where a child has grown up.

Two measures of preschool participation were included; enrollment in CPC preschool programs and enrollment in Head Start. Most of the children in this sample had CPC preschool. Also in Table 1, as early outcome factors, are the kindergarten attributes of cognitive readiness on entering kindergarten (measured by the Iowa Tests of Basic Skills) and academic motivation as assessed by teachers at the end of kindergarten.

After kindergarten, a second category of factors was designated as mediating experiences. These included the number of years that children participated in the CPC program (follow-up services), as well as six intervening variables between years 1 to 4 including parent involvement in school, school mobility, grade retention, special education placement, and children's year 4 perceived competence.

These categories, and their factors, are expected to show a significant relationship with school learning and in particular, in this study, with reading achievement at grade 4. Moreover, the association of these categories with reading achievement are expected to show a temporal relationship. The background category is expected to show its influence on a child earliest in the model with the influence of schooling occurring later. Sometime between the influence of background factors on early growth and later on reading achievement, intervening variables are expected to show an influence on reading achievement. The intervening variables are produced by the influence of background and previous achievement and diminish the direct influence that background and early achievement have on reading achievement in grade 4.

Testing the Model

An analysis is conducted, relying upon multiple regression methodology, which examines the association between the categories and their factors, described above, and reading achievement in grade 4. An examination is first conducted into the relationship between home-demographic and preschool characteristics or student background and reading achievement at the end of year 1. Then an association is examined between early outcome factors and year 1 reading achievement. This procedure establishes the extent to which the association between reading achievement and early outcome factors is independent of a student's background.

Next, a relationship is examined between student background, early outcome factors, and reading performance in grade four. This procedure shows the relationship between background and early outcomes and reading achievement, several years later.

Finally, mediating experiences related to self esteem and attitude, together with unique events during the school years are examined for their relation to grade 4 reading performance. This procedure identifies the contribution that intervening factors, independent of family-demographic and preschool and early outcome factors, make to describing reading achievement in grade 4. The results of these analyses are reported below.

Results

The results in Table 3 show the significant relationship between students' background characteristics and year 1 reading achievement (R^2 = .10). Also, preschool (CPC preschool; R^2 change = .05) and cognitive readiness, and kindergarten motivation (R^2 = .20) contributed significantly to Year 1 achievement. Many of these factors contributed to Year 4 achievement as well. Family and Preschool Factors, however, contributed very little to reading growth between year 1 and 4, although the intervening factors of retention, cognitive readiness, and perceived competence were significant predictors of reading

growth. Parent involvement and age also were significant predictors of year 4 reading achievement, although age, surprisingly, had a negative influence on achievement. The full model in Table 3, including family-demographic, preschool, early outcome, and mediating variables accounted for a substantial portion of the total test-score variance at year 4 (R^2 = .55).

Insert Tables 3 and 4 about here

A summary of the results regarding the predictors of cognitive growth in reading is shown in Table 4. In short, the predictor variables explained 20% of the cognitive growth in reading from year 1 to year 4 above and beyond the 35% variance that is due to initial reading achievement in year 1 (total = .55). Over one-half of this growth-variance (.123) is attributable to mediating experiences, especially grade retention, perceived competence, and parent involvement (see Table 3). Family-demographic and preschool variables explained the least amount of growth variance despite it being the block with the greatest number of factors. This result suggests that efects of family background and preschool intervention are substantially mediated during the early schooling process (see also Section 4). The variance contribution of cognitive readiness and motivation indicate they play a role in this process.

Discussion

The results of this study of reading growth clearly show the influence that factors in a child's environment have on reading growth. Not surprisingly, children with backgrounds that showed the greatest advantages--higher levels of parent education, parent involvement, socioeconomic status, preschool enrollment and so on--showed the highest levels of reading achievement. Moreover, the hypothesis that factors that influence growth are organized into categories and exert their influence temporally also appear supported. The results suggest that the proximity principle, as formulated in this study is a useful concept.

The Proximity Model

This study speculated that a proximity principle governs development in such a manner that factors related to reading growth can be organized into several categories that are linked hierarchically. The results supported this perspective showing that a child's background and early achievement are the basis for later reading achievement. According to this hierarchical model, background variables showed a significant relationship with cognitive performance at a child's entry into kindergarten, as well motivation for school and learning, measures of self esteem, and social maturity. These factors then showed a significant relationship with reading achievement in year 4.

The results of this approach to describing growth emphasize the importance of intervening variables in describing the influences on growth. When the full model for describing year 4 reading achievement, for example, was contrasted against the proximity model described above, only the cognitive readiness for kindergarten, year 1 reading achievement, and age at school entry, from family and preschool factors and early outcome factors, showed a significant direct association with reading in year 4. Thus the influence of parent education, kindergarten motivation, socioeconomic status, and CPC preschool enrollment on reading achievement is mediated by intervening variables such as self esteem and social maturity. Unless the role of intervening variables is appreciated, the influence of Family and Preschool Factors may be underestimated.

Implications

These results show the significant influence that family background and early childhood experiences have on reading achievement and imply that the relationship between background and growth is probably much broader. The hierarchical modeling of achievement that was demonstrated in this study could be applied to other schooling goals as well.

The significant association between family-demographic and preschool intervention factors and reading achievement in years 1 and 4 shows the influence of early experience on cognitive performance. However,

their effects faded considerably over time, thus such factors appear to depend on intervening experiences in exerting effects. No matter, continued efforts in examining the effects of interventions should more closely trace the mechanisms that are responsible for their influence. Differences across programs, for example, will be necessary to truly understand these complex influences. Moreover, the temporal association between intervention-based influences and reading achievement in year 4 in the proximity model further emphasizes their importance in future studies.

Recommendations

In order to improve our understanding of the schooling process for children educationally-at-risk, this study offers the following recommendations:

1. Examine the between group variation for the program groups. Investigate the usefulness of the proximity model for describing growth for each of the respective programs. Determine the extent to which differences between the program groups are associated with reading achievement.

2. Investigate the influence that extensions of the follow-up services offered by the Chapter 2 Child Parent Center have on the growth curve for reading. In the present study, student performance departed significantly from expectation precisely at the termination of follow-up support services.

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Table 1

Variable definitions, means, and standard deviations for model

Variable	Definitions	M	SD
	Outcomes		
Year 4 reading achievement	ITBS Level 9/10 reading comprehension subtest score in logits	-1.57	1.16
Year 1 reading achievement	Baseline measure of reading comprehension ITBS Level 7 in logits	-4.06	1.13
	Predictors		
Family-demographic and Preschool Factors			
Sex	1 = girls, 0 = boys	.51	.50
Age at school entry	in months	63.41	3.73
Parent education	1 = high school graduate, 0 = < high school	.58	.49
Eligibility for free lunch	3 = no subsidy, 2 = partial subsidy, 1 = none	1.21	.54
Missing parent education or eligibility for free lunch	1 = missing, 0 = not missing	.41	.49
School socioeconomic status	Percentage of families in school region who are not low-income (in Kindergarten)	33.21	9.44
Number of siblings		2.42	1.87
Child-Parent Center	1 = CPC preschool, 0 = otherwise	.64	.48
Head Start	1 = Head Start, 0 = otherwise	.06	.23
Early Outcome Factors			
Cognitive readiness	Cognitive readiness on school entry, ITBS Level 5 in logits	-6.38	.84
Academic motivation	Sum of three 7-point items rated by kindergarten teachers: Concentrates on work, Is eager to learn, Tries hard	15.74	4.39
Mediating Experiences (Years 1 to 4)			
School-based factors			
Follow-up services	Number of years receiving CPC follow-up services including extra funds for supplies and teacher support (CPCX)	1.23	1.20
Year 2 parent involvement in school	Teacher rating: 5 = excellent/much, 1 = poor/not at all	2.64	1.21
Year 4 children's perceived competence	Sum of seven 3-point self-rated items: I get good grades in school, I am smart, I get in trouble at home, I try hard in school, I do my homework, I give up when school work gets hard, and I answer questions in class.	17.06	2.76
Transitional life events			
School mobility	Number of school moves from kindergarten to year 4 (grade 4)	.88	1.03
Grade retention	Retained in kindergarten, grade 1, grade 2, or grade 3	.20	.40
Special education placement	Placed in special education in kindergarten, year 2, year 3, or year 4	.10	.30

Note. ITBS = Iowa Tests of Basic Skills.

Table 2

Zero-order correlations of variables in model

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Sex	1.000																	
2. School entry age	-.031	1.000																
3. Parent education	-.056	.016	1.000															
4. Lunch subsidy	-.054	-.030	.120	1.000														
5. School SES	-.024	.041	-.001	-.035	1.000													
6. Sibling size	.055	.042	-.009	-.042	-.020	1.000												
7. CPC preschool	.043	-.078	.050	-.009	.055	-.094	1.000											
8. Head Start preschool	.005	-.019	-.031	.040	-.088	-.012	-.334	1.000										
9. Cognitive readiness	.074	.186	.198	.157	-.029	-.038	.224	-.043	1.000									
10. Motivation	.167	.150	.133	.010	.110	-.035	.099	-.085	.306	1.000								
11. Year 1 achievement	.149	.098	.171	.171	.058	-.062	.239	-.090	.466	.438	1.000							
12. Follow-up services	.000	.035	.110	-.010	.131	-.110	.379	-.254	.137	.177	.266	1.000						
13. Parent involvement	.050	-.030	.157	.092	.069	-.077	.119	-.060	.212	.287	.353	.188	1.000					
14. School mobility	-.012	-.052	-.114	-.046	-.001	.036	-.058	.026	-.189	-.125	-.166	-.473	-.216	1.000				
15. Grade retention	-.135	-.063	-.119	-.097	-.009	.051	-.112	.078	-.321	-.332	-.372	-.183	-.243	.213	1.000			
16. Special education	-.099	.025	.041	-.025	-.051	.062	-.093	.017	-.167	-.248	-.190	-.053	-.085	.006	.181	1.000		
17. Perceived competence	.099	.007	.032	.077	.007	-.044	.058	-.057	.216	.261	.319	.094	.195	-.063	-.139	-.148	1.000	
18. Year 4 achievement	.176	.013	.180	.166	.083	-.020	.158	-.098	.425	.417	.595	.192	.341	-.141	-.568	-.225	.346	1.000

Note. Correlations based on pairwise-present cases.

Table 3

Regressions of year 1 and year 4 achievement on family-demographic, early school, and mediating variables

	Outcome															
	Year 1 achievement						Year 4 reading achievement									
	(1)		(2)		(3)		(1)		(2)		(3)		(4)	
Predictor entered:	B	Beta	B	Beta	B	Beta	B	Beta	B	Beta	B	Beta	B	Beta
Family and Preschool														
Sex (1 = girls)	.40*	.17*	.37*	.16*	.19*	.08*	.46*	.20*	.44*	.19*	.18*	.08*	.11	.05
Age at school entry	.03*	.11*	.04*	.12*	-.01	-.01	.01	.02	.01	.03	-.03*	-.09*	-.02*	-.07*
Parent education (1 = grad)	.36*	.16*	.33*	.15*	.12	.05	.40*	.17*	.38*	.16*	.12	.05	.10	.04
Eligibility for free lunch (3 = no subsidy)	.34*	.16*	.35*	.17*	.25*	.12*	.34*	.16*	.35*	.16*	.14	.07	.10	.05
School SES	.01	.06	-.01	-.05	.01	.03	.01*	.09*	.01	.08	.01	.05	.01	.05
Number of siblings	-.04	-.07	-.03	-.05	-.02	-.03	-.01	-.02	-.01	.01	.01	.02	.02	.04
Missing parent education and eligibility for free lunch	.15	.07	-.14	-.06	-.05	-.02	-.20	-.09	-.19	-.08	-.11	-.04	-.01	-.01
CPC preschool (1 = CPC)			.53*	.23*	.31*	.13*			.29	.12*	-.06	-.03	-.05	-.02
Head Start (1 = Head Start)			-.05	-.01	-.04	-.01			-.26	-.05	-.23	-.05	-.12	-.02
Early Outcome factors														
Sch entry cognitive readiness					.41	.31*					.24*	.18*	.15*	.11*
Kindergarten motivation					.08	.30*					.04*	.17*	.02	.06
Year 1 reading achievement											.43*	.42*	.31*	.30*
Mediating Experiences														
School-based factors														
Follow-up services													.01	.01
Year 2 parent involvement													.07t	.07t
Year 4 perceived competence													.06*	.13*
Transitional life events														
School mobility (after k to 3)													.05	.05
Grade retention (in K, 1, 2, or 3)													-1.02*	.35*
Special education (Years 1 to 4)													-.13	-.03
Variance explained	.099		.150		.352		.101		.122		.430		.553	

Note. B = metric coefficient, Beta = standardized coefficient. Missing-data dummy variable was entered with parent education and lunch subsidy eligibility removed. (1) = Family; (2) = . . . + Preschool; (3) = . . . + . . . Early School Outcomes; (4) = full model.

* $p < .05$; t = $p < .06$.

Table 4

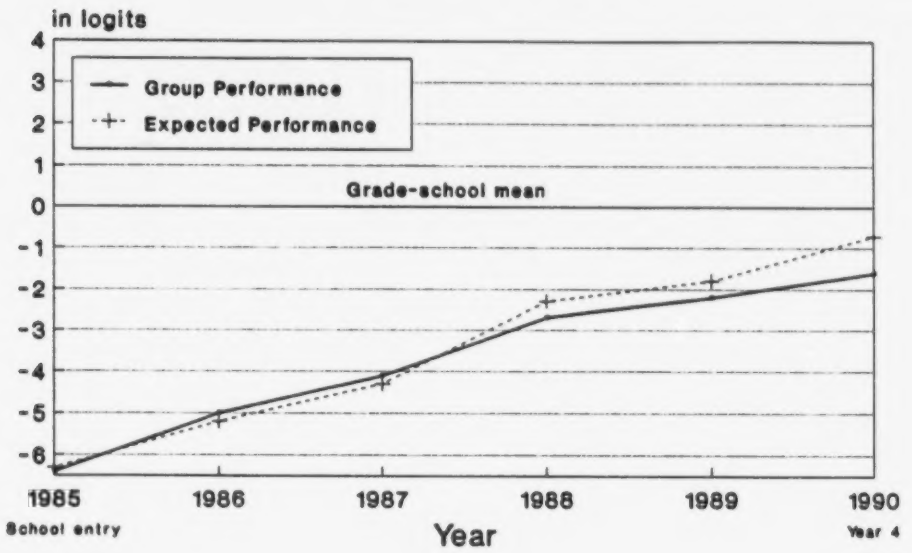
Unique Variances in Cognitive Growth in Reading

Predictor block entered:	Variance explained	
	Unique Variance	Cumulative Variance
1. Year 1 achievment (Baseline)	.354	.354
2. Family-demographic and preschool	.027	.381
3. Early school outcomes (kindergarten)	.049	.430
4. Mediating experiences (years 2-4)	.123	.553

Note. Year 1 achievement = baseline reading achievement. Family-demographic and preschool = sex, age at school entry, school socioeconomic status, parental education, eligibility for free lunch, and number of siblings, and Child-Parent Center and Head Start. Early school outcomes = cognitive readiness and kindergarten motivation. Mediating experiences = CPC follow-up services in years 1 to 3, teacher-rated parent involvement in year 2, perceived competence in year 4 (**School-related factors**), school mobility (after K to 3), grade retention (in K, 1, 2, or 3), special education placement (in years 1-4) (**Transitional life events**).

Figure 1

Reading Achievement
School Entry to Year 4



Note. The expected performance is based on grade-equivalencies established by Iowa Tests of Basic Skills (ITBS) norms. ITBS test scores for group performance have been transformed to one-parameter logistic scale values.

Section 6

Study 3: Influences on Writing Development

Nancy A. Mavrogenes and Nikolaus Bezruczko

Writing is the step-child of American Education. This is confirmed periodically by the National Assessment of Educational Progress (NAEP), which recently reported that overall writing performance of students at all grade levels was "poor, and the achievement gaps between students from disadvantaged and advantaged areas was substantial. ... Black 12th graders barely outperformed white 4th graders." Furthermore, "only half of [all] 12th graders reported writing more than two papers in the previous six weeks, and most said their writing consisted of a few paragraphs." Reading instruction was almost as bad. Half the students in all grades said they read 10 or fewer pages each day, and "by the 12th grade the average performance of black and Hispanic students only reaches the level of 8th-grade white students" (Rothman, 1990, p. 9). Furthermore, the reports also show "that those who read and write more frequently perform best in those subjects" (Rothman, p. 1).

Other studies confirm and extend these findings. Not only is little time spent on writing, but the emphasis in what instruction exists is not on content and cohesion but on grammar and punctuation (Bridge and Hiebert, 1985; Deckert, 1988; Graves, 1978; Hymes, 1979; Shuman, 1990). One study of writing instruction in elementary schools found that most of the writing time consisted of verbatim copying of others' texts and that teachers neglected opportunities to relate writing to class activities (Bridge and Hiebert, 1985). The reasons for such a state are, first, that language arts texts stress the teaching of grammar and mechanics, with only fragmented writing tasks, and, second, that teachers don't feel prepared to teach writing. Since no requirement exists for teachers to take courses in writing theory and prectice, they know little about how to teach it, do not feel confident about their own writing, do not know who the authorities are or where to find good research articles (Graves, 1978; Shuman, 1990; Walmsely, 1980).

Purpose

This study attempts to use our extensive data base to look for influences on children's writing development. "Writing" is used in the sense of composition, not handwriting. Questions include how well at-risk students express themselves in writing, whether they like writing and how much of it they do, whether their writing ability correlates with their achievement in reading and math as measured by standardized tests, and what factors in their backgrounds make a difference in their writing.

Methods

Data

Students' writing ability was assessed from their open-ended answers to two questions on their year 4 questionnaire: (1) "Tell us what you like about school" and (2) "How do you think school could be made better?" The number of students who returned their questionnaires was 856; however, only 735 answered both questions so that a complete assessment could be made. Achievement scores came from students' reading comprehension and math total subtest scores on the Iowa Tests of Basic Skills (ITBS) administered each spring as part of the city-wide testing program. Correlations were calculated based on answers to questions on the teacher questionnaires years 1-4, parent questionnaires years 2 and 4, and student questionnaires years 3 and 4. A case study is also presented from samples of one student's writing collected from K through grade 3.

Scoring of Writing

The open-ended answers to the two questions on students' year 4 questionnaires were scored by three experienced evaluators. Each question could receive a maximum total score of 6 points, 2 for content, 2 for mechanics, and 2 for language usage/facility. For content or meaning, scores were given as follows: 2--an elaboration of one idea or several integrated ideas, 1--a single simple idea or a mere list, 0--garbled or vague so as not to be understandable. Scores for mechanics were 2--correct use of periods, commas in series, and capitals; 1--at least one correct capital letter or period; 0--none of the above. Spelling was not considered. For language usage/facility, 2 was given for a whole sentence; some use of the suffixes -s, -ing, and -ed on verbs; subject-verb agreement--in other words, the evidence of some sophistication in language usage. A score

of 1 indicated an incomplete sentence or little knowledge of verb endings or subject-verb agreement, and 0 was for a garbled idiosyncratic response. The evaluators agreed to err, if necessary, on the side of generosity, always keeping in mind that these children were only 4th graders. Inter-rater reliability was .87; however, after discussion, the agreement was 100%. Five scores were computed: total content (possible 4), total mechanics (possible 4), total usage (possible 4), total for the question on liking school (possible 6), and total for the question on improving school (possible 6).

Some examples might help clarify the scoring system. This answer to the question about what the students like in school received 2 points for content, 1 for mechanics, and 2 for usage: "I like learning Math even though I get C's. I like my friends and I like my teacher she believ's in me." This answer was scored 2 for content, 1 for mechanics, and 1 for usage: "A like my teacher Mrs. Pilot I like the work she give me. She like to tell us how to do it in a nice way." A poorer answer earned 1 for content, 0 for mechanics, and 1 for usage: "I lake Math and I lake art" For the other question, about how school could be improved, this answer received 2's in all areas: "I think the school would be better if they will just have 4 graders in one room and 5 graders in another room." This one was scored 2 for content, 1 for mechanics, and 1 for usage: "They can clean it up. It be roches in the kitchen spider in the room. There was a rat in my sister room." This poorer answer received 0 for content, 1 for mechanics, and 1 for usage: "school could be made better because you could about anything."

Quantitative Analysis

All empirical analyses of the relationships between scored writing samples and questionnaire answers are based on Pearson product-moment correlations. The analysis of differences between ability subgroups is based on independent t-tests. Differences between writing and reading questionnaire responses were analyzed with an analysis of variance, aggregating teacher, parent, and student questionnaires within their respective years.

Qualitative Analysis

Nine samples of one student's writing were collected from K through grade 3. They are described by narrative technique in the section on results. Trends and patterns are noted.

Results

Writing Ability

The first group of results has to do with students' writing ability. The means for each of the five writing scores were 2.7 on content (67% of a possible 4), 1.7 on mechanics (43%), 2.1 on usage (53%), 3.4 on the question about liking school (57% of a possible 6), and 3.1 on the question about improving school (52%). Except for content, the CPC groups scored significantly higher than the CESP group. In addition, the five writing scores correlated only modestly (.12-.32) with the ITBS reading and math scores K-4. The lowest correlations were consistently on content (.12-.23) and the highest (.15-.31) on mechanics. In general, the correlations became higher through the years (.21-.32 for year 4).

Possible understandings of these relatively low scores and correlations might come from answers to questions on the questionnaires. For instance, on the teacher questionnaires years 1-4, the lowest ratings were consistently given to the item enjoys creative or composition writing. An examination of answers about writing and reading on the questionnaires (teacher 1-3, parent 2, and student 3 and 4) also gives revealing results. As Table 1 shows, on all questionnaires the writing questions were rated significantly lower than the reading questions. For both writing and reading, questions were of two kinds: liking (enjoys writing, reads for enjoyment) and doing (I write notes, I read at home). In all, there were four questions on doing writing, five on liking writing, nine on doing reading, and seven on liking reading.

Place Table 1 about here

On the teacher (years 1-4) and parent (years 2 and 4) questionnaires some items showed a pattern of increasingly lower ratings. On the teacher questionnaires these items were reads for enjoyment, is well-behaved, learns easily, concentrates on work, is motivated to learn, and takes responsibility for actions. On the parent questionnaire the items that were rated lower from year 2 to year 4 were child goes to the library, child reads books, child writes stories or notes, parent cooks with child, and parent goes on outings with child. The only items whose lowest ratings declined were, for teachers, parents' interest in child's progress and, for parents, parent reads to child.

Influences on Writing Development

Another important group of results has to do with what appears to influence writing development. A first analysis appears in Table 2, showing significant differences between the highest 10% in writing scores and the lowest 10% on selected questionnaire items. The total writing means for the highest 10%, the middle 80%, and the lowest 10% were significantly different: 10.5 for the highest, 6.5 for the middle, and 2.6 for the lowest (88%, 54%, and 22% out of a possible score of 12). The reading grade equivalent means were also significantly different: 4.2 (almost on grade level) for the highest, 3.6 for the middle, and 3.0 for the lowest.

Place Table 2 about here

As can be seen in Table 2, the significant differences between the groups were on effort, attitude, teacher and student expectations, maturity, motivation, and parent participation in school activities. Another difference appeared on marital status of parents: students whose parents were married scored higher than those whose parents were separated, never married, divorced, or widowed, and the highest group did better than the lowest group.

Writing scores were also correlated with numerous background items taken from questionnaires from all years. The largest (.09-.30) and most numerous significant correlations appeared for cognitive readiness, motivation, self-confidence, maturity, and attitude. Living with a single parent and being retained by year 4 resulted in significant negative correlations (-.09 to -.12). The lowest correlations on all items were for content and the highest for mechanics.

When writing scores were correlated with answers on teachers' year 4 questionnaires, all answers produced low (.09-.32) but significant correlations. The highest (.28- .32) appeared for these questions: learns easily, concentrates, is motivated, enjoys composition writing, teacher's expectations for child's future success, final grade in reading, instructional level in reading, and a composite of items on maturity. Again, the lowest correlations were for content and highest for mechanics. Another result is that for questions about teachers' expectations, final grade in reading, and instructional level in reading the correlations were higher (.8-.16 points) for mechanics than content, revealing something about teachers' values.

Table 3 presents significant correlations between writing scores and year 4 student and parent questionnaires.

Place Table 3 about here

Only those items are included that had higher or more or interesting correlations. As can be seen, these correlations involve attitude, maturity, self-confidence, effort, interest in school, popularity, behavior, doing homework, answering questions in class, teacher and student expectations, mobility (negative), teacher and parents reading books to students, and pleasing parents. Lowest correlations for content and highest for mechanics were the same as for the other analyses. Another point about all the analyses is that, except for three items on the year 4 teacher questionnaire, none of the items about liking or doing reading and writing produced significant correlations.

Case Study

A final analysis concerns the writing samples collected from one student K through grade 3 (see Figure 1). Samples 1-3 are from kindergarten and show the student's progression from no writing (but letter-like forms) through letters and scribbling to real composition. The kindergarten teacher understood the writing process and had her class write frequently, even if all they produced was scribbling and miscellaneous letters. Samples 4-5 are from grade 1. Number 4 was produced by the student (in March) only after the first author had visited the class and, seeing that no writing was being done, discussed with the teacher the importance of composition. After that the teacher had her students keep journals. Sample 5 presents two pages from this subject's journal at the end of the year. Not only can she think of little to write about, but she can hardly wait for school to end.

Samples 6-7 are from grade 2. The first one (6) was written in January after the first author asked the student to write her a letter. All the child could think to write was to copy from a book. Number 7 is a typical sample later in the year. The teacher admitted she had had the class do little writing because she was too busy "correcting work sheets and ditto sheets." In grade 3 the student wrote the minimum number of compositions required by state mandate (about six). Sample 8, one of the longest of the year, is an interesting example from year 3 because the student remembers her kindergarten year and the writing done then as a "memorable event." The last example is a piece of writing the student sent the first author at the end of year 3 when she had been asked by this author to write a story at home. This sample covered both sides of a legal sheet of paper and consists of a very imaginative, if not always logical story (because it had not been

proofread). What the last sample shows is that the student is still able to write and enjoys writing if she is given encouragement and opportunity.

Discussion and Implications

Writing Ability

The results of the analyses form two groups. The first has to do with how well the students write, how much writing they do, how much they like writing, and possible reasons for what was found. How well they write can be seen from the mean writing scores: from 43% to 67% of total possible points. The highest 10% received 88%, the lowest 22%. Except for the highest 10%, these scores are low (hardly passing by most grading standards). One reason why writing scores are low is that students don't enjoy writing: for all four years teachers rated enjoys writing the lowest of the 18-25 items thay were asked to rate. Furthermore, on all three kinds of questionnaires (teacher, student, parent) writing questions were rated significantly lower than reading questions. These questions were of two types: how well students like to write and how much writing they do. In other words, the reason students don't like to write is that they don't do much writing and thus don't know how to do it. This conclusion is confirmed by the case study of one girl's writing development: she did write and progressed well in kindergarten but then remained static as she did very little writing in grades 1-3.

Other insights come from teachers' ratings years 1-4 and parents' ratings years 2 and 4. The teachers rated lower from year to year reads for enjoyment as well as items about behavior, concentration, motivation, responsibility, and learning easily. Parents rated lower from year to year child writes stories or notes, child reads for pleasure, and items about doing things with the child such as going to the library, cooking together, and going on outings together. The two items that were rated higher, parent's interest in child's progress (teachers) and parent reads to child (parent) may offer some hope for the future. However, the items rated lower (reading for pleasure, writing, behavior, motivation, etc.) certainly have to do with success in school as well as with success in writing.

The low correlations between writing ability and achievement scores, especially the fact that content always correlates lower (.12-.23) than mechanics (.15-.31), might show that mechanics are more valued and more taught in school than meaningful content. This pattern, in fact, held up through the analyses: on the teacher, student and parent questionnaires and the correlations between writing scores and selected background characteristics. Such a rating pattern on the teacher questionnaire for items like child's final grade in reading, child's final grade in math, and child's instructional level in reading shows teachers' values. This instructional emphasis on mechanics rather than content is confirmed by studies throughout the nation (Bridge and Hiebert, 1985; Deckert, 1988; Graves, 1978; Hymes, 1979; Shuman, 1990).

Influences on Writing Development

The second group of results shows what appears to influence writing development. Surprisingly, what students and parents said about students liking and doing writing and reading did not correlate significantly with writing ability. On the other hand, teachers' answers about writing did. Throughout the three kinds of questionnaires what consistently and significantly correlated were effort, attitude, teacher and student expectations, maturity, motivation, self-confidence, and behavior. Schools certainly do not have complete control over affective characteristics, but it would seem that they might directly influence teacher expectations and student self-confidence, which in turn might influence the other characteristics.

Other items which correlated with writing development in at least one analysis were parent participation in school activities, cognitive readiness, concentration, interest in schools, and teachers and parents reading books to students. In connection with "storytime," students' liking to have books read to them correlated negatively with writing development, perhaps because many books weren't read to them and they thus were unaware of the pleasures of this activity or because the wrong kinds of books were read. Other negative correlations, as would be expected, were living with a single parent, retention, and mobility.

Recommendations

The recommendations that come from this study are two. First and most important is that more composition must be included in the school curriculum and it must be taught by teachers who know about writing and who themselves have some experience with it. Knowledge about grammar, punctuation, and capitals is just a part, and a rather small part, of the writing process. Children must understand that writing is communication for a particular purpose and a particular audience. Thoughts must be organized in a meaningful way so that they make sense to the reader. Editing helps refine the process, and at that point

mechanics become important because they help to clarify, not because they by themselves make up writing. Perhaps Walmsley's (1980) suggestion that states and school districts require teachers to have training in teaching composition is a good one. If teachers don't know how to teach writing and don't write themselves, certainly their students won't like or do writing either--and that is what this study found. That this disadvantaged population is able to profit from opportunity and instruction is evident in the progress the student in the case study made in kindergarten.

The second recommendation is that schools can and should pay more attention to affective factors such as teachers' expectations and students' self-confidence. If teachers worked harder to boost students' self-confidence and communicated higher expectations, then other factors essential in school should improve too, such as motivation, effort, attitude, maturity, and behavior. Teaching is not an easy job, but any knowledgeable and sensitive teacher knows that writing in the sense of composition is crucial to people's success in the world and that a caring attitude toward each child with high expectations can go a long way in helping fit children for the tasks ahead of them.

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Table 1

Questionnaire Ratings for Questions about Writing and Reading

		Years:	1	2	3	4
Liking	Reading		+	+	+	+
	Writing					
Doing	Reading		+	+	+	+
	Writing					

Note: The plus mark (+) indicates items that were ranked higher in a comparison. All differences are significant at the .05 level.

Table 2

Significant Differences Between Highest and Lowest Writing Groups on Selected Questionnaire Items

Questionnaire and Year	Item	Range of Scores	Highest Mean	Lowest Mean	Level of Significance
Parent 4	Marital status	1 married, 0 other	.38	.15	.04
Student 3	I give up when school work gets hard	1 a lot to 3 not much	2.7	2.4	.04
Student 3	I try hard in school	1 not much to 3 a lot	2.8	2.5	.01
Student 3	5 items on attitude	each: 1 not much to 3 a lot	13.7	12.9	.03
Student 4	I give up when school work gets hard	1 a lot to 3 not much	2.7	2.4	.02
Student 4	When I get bad grades, I try even harder	1 not much to 3 a lot	2.6	2.4	.02
Student 4	I try hard in school	Same	2.8	2.4	.01
Student 4	My teacher thinks I will go far in school	Same	2.8	2.2	.01
Student 4	How far in school do you think you will get?	1 8th grade to 4 college	3.9	3.6	.01
Student 4	5 items on attitude	each: 1 not much to 3 a lot	13.8	13.0	.01
Teacher 3	Parent's participation in school activities	1 poor to 5 much	3.1	2.2	.01
Student 3	8 items on maturity	each: 1 not much to 3 a lot	22.7	17.1	.01
Teacher 4	Is motivated to learn	1 not at all to 5 much	3.8	2.5	.01

Table 3

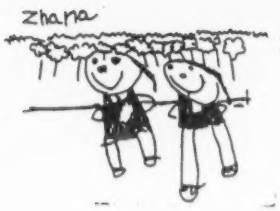
Correlation of Student and Parent Questionnaires Year 4 and Writing Scores

Item	Content	Mechanics	Usage	Q1: Liking School	Q2: Making School Better
Student Questionnaire					
I do not get bored in school.	-	.15	.09	.11	.12
I get good grades in school.	.11	.20	.17	.18	.18
My classmates like me.	-	.09	.12	.08	.08
I do not get in trouble in school.	.11	.16	.12	.17	.13
I like school.	-	.11	-	.12	-
I get along well with others.	-	.09	.10	.09	.09
I like to have books read to me.	-	-.10	-	-	-.09
I do my homework.	-	.10	-	.10	-
My teacher reads stories to us.	-	-	.12	.10	-
I answer questions in class.	.08	.14	.09	.11	.12
When I do well in school, my parent is happy.	-	.14	.09	.10	.11
When I get bad grades, I try even harder.	.12	-	-	-	-
I try hard in school.	.11	.12	.12	.14	.12
My teacher thinks I will go far. in school.	.09	.21	.13	.16	.18
I am smart.	.11	.13	.10	.12	.13
School is important	.09	-	-	-	-
My parent reads to me.	-	-.13	-	-.10	-.09
How far in school do you think you will get?	-	.12	-	-	.10
How many schools have you attended since kindergarten?	-.08	-.15	-.12	-.14	-.13
Combination of items on attitude.	.08	.12	-	.12	.09

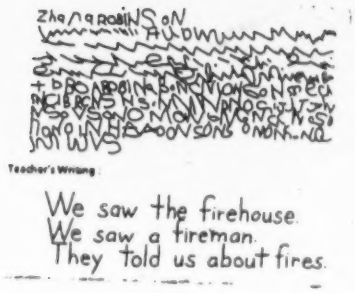
Table 3 (Con't)

Item	Content	Mechanics	Usage	Q1: Liking School	Q2: Making School Better
Student Questionnaire					
Combination of items on self-confidence.	.15	.24	.17	.27	.30
Combination of items on maturity.	.19	.31	.21	.30	.28
Parent Questionnaire					
School informs me about school events.	-	.15	.11	.17	.11
My child tries hard in school.	-	.20	-	.12	.14
My child is happy in school.	-	.17	.12	.12	.17
I help in my child's classroom.	-	-	-	-	.12
My child stays home from school.	-	-.12	-.12	-.12	-
I praise my child for improving in school.	.12	.12	-	.16	-
I limit my child's TV time.	-	.11	-	-	.11
How far in school will your child get?	-	.14	.13	-	.15
How satisfied are you with the education your child has received?	-	.11	.11	-	.12
Are you a member of the Local School Council?	-	-	-	-	.16

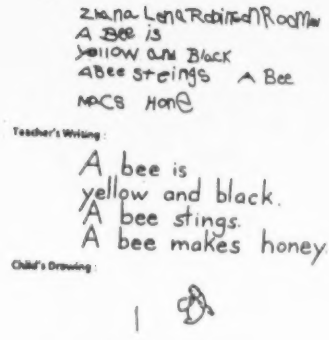
Figure 1



Sample 1



Sample 2



Sample 3

Zhana Robinson March 9, 1988.

I love my pet because and she is a gerl cat and I love her vorey moech.

Sample 4

June 14, 1988	June 15, 198
Dad I love	I'm glad
you and mom	June 30
very very	I'm not
very very	in school.
very much.	

Sample 5

1/13/89

Dear Mrs. Shannigans

I I can write The Hobyahs for you.

The Hobyahs

Once upon a time there was an old man an old woman a tiny little girl and their dog, little dog Furpie. They lived in a house made of sticks near a deep dark damp swamp. Out in the deep, dark, damp swamp lived some Hobyahs. One night, when the old man and old woman and the tiny little girl were were all asleep, the Hobyahs came.

Sample 6

Zhana Robinson
Chalmers School

March 16, 1989
Room 101

I like a dog that way it's tail a lot. That my best pet. I play with her. Her name is Lonaisha's she best pets I ever had. When I play with him she roll. I like her a lot.

Sample 7

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Figure 1 (cont.)

Minna Robinson
Bethune School

April 4, 1990
Room 213. Gr. 3

Memorable Event

I remember when I wrote a story about fish and stew-fish, and some people put my story about fish in a contest in book. I wrote more than one story. One story I wrote is about my family and I have one brother and two sisters. I wrote my name, and my friends name too. When I was in kiddie garden I wrote many storys, my teacher read them and she liked them. In kiddie gardon my teachers name was Mrs. Will and I wrote notes and story to my teacher Mrs. Will. Today I have a sweet and nice teacher name Mrs. Chamberlain. I like Mrs. Chamberlain.

Sample 8

The giant Rabbit

Once upon a time in a big city, there was a little village near by and a little house where six people live there. One day a giant rabbit came to the little village. The large rabbit came to the one little house in the village because every body else can to the big city. The giant rabbit hopped very fast as he was coming Thump-thump Thump-thump. We were scared. My mother look out the window.

And she said "run every one-run" We all ran and ran But the giant rabbit blocked our way.

But the giant rabbt said "Don't be afraid of me I'm not going to eat you" In a loud hoarse voice.

My father baked it that giant rabbit story and the rabbit started to cry.

My father said "If I trust the rabbit [illegible] said "[illegible]" And then my father [illegible] a big chair for the giant rabbit.

[illegible] Zhana [illegible] Zylinda [illegible] daddy

Sample 9

The little girl Zhana said, you guys don't you have to go to the store, and Zylinda said you have to go to school with Zylinda and Zipporah.

They all said "Run you have to go to school."

Zhana said "no I'm only three years old." So everyone mad were they said they were going to go.

Zhana said to the giant rabbit in a soft voice "Are you hungry and What's your name young rabbit??"

In reply the rabbit said "I don't have a name I guess and I would like some barbeque" I gave the rabbit it's food and said "I will name you Michel Ol. My father died in the hickety."

Michel said softly "I'm sorry I have to go and I just encourage he started to cry." I started to cry too and said GOOD-BY my dear friend in a softly and sad voice."

Michel went home happily ever after.
My mother [illegible] back with my brother and sisters and [illegible] the rabbit.

[illegible] He had to [illegible] a [illegible] [illegible] [illegible]

Section 7

General Discussion and Implications

The analyses presented in this symposium represent our continuing efforts to document and understand the factors influencing the school adjustment and success of children at risk. A major conclusion of this report, however, is that taken in isolation these factors are not enough to improve or even sustain children's academic performance--they must be reinforced continuously by schools, parents, as well as children themselves. Among the important mediating factors are cognitive readiness, teacher ratings of school progress, motivation, parent involvement in school, and school practices of grade retention. Some specific points are detailed below.

1. Preschool in and of itself does not improve children's school success by grade 3, at least the government-funded programs analyzed in this study. Rather its positive influence is dependent on intervening factors measured after preschool including cognitive readiness, teacher ratings of school adjustment, parent involvement in school, and the avoidance of school mobility and grade retention. Over time these factors appear to play a greater role in school adjustment than preschool per se. Although these results are similar to previous findings, they go beyond prior studies by showing that school mobility and grade retention help mediate the effects of preschool on early school achievement and by providing empirical support for parent involvement in school as a mediator of preschool effects as conceptualized by Bronfenbrenner (1975) and Wachs and Gruen (1982).

One implication of these results, as well as the patterns of adjustment detailed in Section 3, is that future investigations should give greater priority to the causes and effects of school mobility, grade retention, and parent involvement. For example, it is notable that while Reynolds (Section 4) found negative effects of school mobility on year 3 achievement which are consistent with previous year 1 and year 2 studies (Reynolds, 1989a, 1989b), mobility effects were absent in year 4 (Bezruczko, Section 5). Although it is possible that children get acclimated to such frequent school moves over time, the nature of this inconsistency is not yet clear.

2. Although children in this sample showed less cognitive growth over time than the student population at large, a number of factors are predictive of this growth including grade retention, cognitive readiness, self-perceptions of academic competence, and parent involvement. These and other factors explained a substantial amount of variance in reading growth, net of background factors. Some of these factors may be a focal point for improving children's school success. For example, children's perceptions of their own competence, apart from cognitive performance, suggests the importance of enhancing affective characteristics. That family background factors and preschool experience did not contribute to cognitive growth further illustrates the importance of intervening school experiences in reading development.

3. Regarding writing development, results indicated generally poor writing performance among students, which most likely stems from a weak emphasis on writing in the early grades. Perhaps in the concern over children's reading development, writing is given low priority in the curriculum, thus students themselves do not like to write. The significant relationships between writing development and affective characteristics indicates that building greater interest in writing may help improve writing ability.

Present results support the following policy implications.

1. <u>Preschool experience has complex effects, and plays a significant role in early school adjustment</u>. Although many educators support preschool programs, their support is not often based on conclusive empirical findings. This study found that preschool contributed significantly to early school adjustment in

complex ways that have been unapparent in previous studies. First, participation in CPC preschool programs had a significant positive effect on the amount of parent involvement in school activities. Because parent involvement positively affected year 3 achievement, preschool influenced year 3 achievement through its influence on parent involvement. That is, children who had both preschool and parents that were involved in school were more likely to be successful.

Second, preschool had a significant influence on entering school cognitive readiness, a major predictor of early school success. As with parent involvement, preschool influenced achievement in the first three years of school by influencing cognitive readiness.

Third, in addition to the greater achievement performance of Chapter 2 CPC children, Chapter 1 and 2 CPC children experienced less mobility and less retention than other children, both of which are predictors of later achievement. That Chapter 2 H-S children, who did not have preschool, outperformed Chapter 1 CPC children in achievement in year 3 suggests that positive effects of preschool on achievement over time are not automatic and, in some cases, may not yield results over and above those of quality all-day kindergarten programs. Additional analyses of achievement as well as non-cognitive outcomes may further clarify preschool effects.

However, in total, the findings of this study call for vigorous efforts to extend government funded preschool programs to all eligible children, particularly, the Chapter 2 CPC program, which includes both preschool and all-day kindergarten. Preschool positively and significantly affects early school adjustment by affecting cognitive readiness skills, teacher ratings of socioemotional maturity, and parent involvement, all of which are linked to later achievement and grade retention.

2. Intervention for children at risk should occur early in the schooling process or before. This recommendation relates to the time of intervention. We found that as children move through the primary grades, the opportunities for improving school success become less likely. Ideally interventions that occur before formal schooling may provide the best hope for children at risk. This is borne out by the pervasive effects of entering cognitive readiness. It influenced (directly or indirectly) nearly all other factors in the schooling process and had one of the greatest effects on early school adjustment. This suggests that improving cognitive readiness on and before school entry may be a most effective means of improving children's potential as well as preventing later academic problems. This result further reinforces the importance of preschool and other early stimulation programs such as day-care as well as naturally occurring parent-child interactions.

3. Grade retention has negative effects on early academic achievement and should be discouraged. The results of this study are consistent with many others: retaining children early in school has a negative effect on achievement, independent of other factors (Holmes, 1989). In fact, retention had among the largest effects in two studies (see sections 4 and 5). Also, retaining children appears to play a role in neutralizing the effects of preschool and children's commitment to school. Because more children are retained over time, the effects of retention also increase over time. For these reasons, grade retention is not sound educational policy. As House (1989) noted in his review of retention research, "almost everything points in the same direction - retention is an extremely harmful practice" (p. 210). One practical alternative to retention is promotion with remediation, which may reduce the stigmatizing effects of retention that many children experience.

4. Parent involvement in school is an important link in early school success and should be fostered. Despite the heuristic appeal of parent involvement as a consistent and effective way to bolster school success, previous research does not support this conclusion. However, we found positive effects of parent involvement in two respects. First, it had significant direct and indirect effects on primary grade outcomes. Children whose parents were rated as being more involved in school had higher achievement and more

positive ratings of maturity as rated by their teachers.

Second, and possibly more important, parent involvement enhanced the effects of preschool, academic motivation, and kindergarten achievement. This result is important in that parent involvement in school, when present, appears to be a condition that enhances early school success. Without it, the effects of other variables were reduced.

Comer (1988) provided evidence of how successful programs can be in improving the family-school relationship. A comprehensive intervention was implemented in two low-achieving elementary schools over a 15-year period. The program stressed the development of academic, interpersonal, and social skills with the philosophy that "the key to academic achievement is to promote psychological development in students, which encourages bonding to the school" (p. 46). This attachment to the school was accomplished by developing positive interaction between parents and school staff, attending to interpersonal and social skills development, and developing a comprehensive school plan based on cooperative management between the principal, teachers, parents, and mental health professionals.

For example, social activities between families and school personnel were conducted, social skills training programs for children were instituted, parents were hired as classroom assistants, and "discovery" rooms for children who have lost interest in school were created. The program appeared to have an effect on achievement over time. It should be noted, however, that contact between families and schools per se was not enough. It took time, a cooperative and comprehensive approach to school management, and a desire to align the interests of families and schools. The issue of the quality of parent involvement is also important to consider in implementing successful parent involvement programs. Moreover, additional research is needed to determine the specific types of parent involvement that are most effective.

5. School personnel and administrators should encourage school stability. The increasing prevalence of school moves over the early grades indicates the pervasive environmental disruptions that children face. Although the negative influence of school mobility on year 4 achievement was much less than in previous years, its effects have contributed to adjustment problems in the early schooling process. That its effects increased from years 1 to 3 suggests that school mobility should be discouraged as much as possible during this period. The fact that mobile children were less motivated, less prepared to do well in school, and lived in poorer areas than other children indicates that school personnel need to do all they can to encourage and maintain a stable learning environment for children.

School practices that may minimize the impact of school mobility include (1) increased support services for children after they have moved such as orientation programs, home visitation, parent-teacher conferences, and the development of children's peer networks and (2) coordination of instructional programs between schools.

6. Place greater emphasis on writing development in school curricula. The poor performance of children in writing as measured in this study indicates greater efforts must be expended to include composition writing in school curricula. Also, it must be taught by teachers who know about writing and who themselves have some experience with it. If teachers don't know how to teach writing and don't write themselves, certainly their students won't like or do writing either. That this at-risk population is able to profit from opportunity and instruction is evident in the progress the student in the case study made in kindergarten. Affective factors such as attitudes toward school, motivation, and teacher expectations may be key ingredients in improving children's writing performance since they foster the idea that literacy is a valuable outcome of education.

7. Approaches to improve the schooling of at-risk children must be multifaceted. The most striking result of the study so far is the truly complex, intertwined network of influences that exist in the early schooling process. Consequently, success for at-risk children is often dependent on the interaction of many variables

working in concert (e.g. preschool and parent involvement, motivation and achievement, grade promotion and school stability). While early intervention is an important source of school readiness, it is clearly not enough; the positive effects of many variables must reinforce each other over time. Continuity in the early schooling process appears particularly critical in enhancing and maintaining effects. Parent involvement, school stability, grade promotion, and experiencing a sense of school competence signify this continuity.

Future Directions

As we continue to follow this panel of children through the schooling process, other factors in children's development will be considered. Of particular interest is measuring instructional factors, peer relations, and the continuing role of factors that have shown to be significant mediators of children's school success in previous studies (e.g., mobility, parent involvement, motivation). Further investigation of non-cognitive outcomes such as attitudes toward school and perceived competence will also be essential in getting a comprehensive picture of children's adjustment. An additional issue will be to begin to understand the variation in children's cognitive and social outcomes in regard to factors that promote resilience.

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